

DISCARD



Digitized by the Internet Archive
in 2007 with funding from
Microsoft Corporation

Electric Railway Journal

Volume 65

January to June 1925

McGraw-Hill Company, Inc.

Tenth Avenue at Thirty-sixth Street

New York City

How to Use the Index

This index is essentially a subject index, not an index of titles, and articles treating a number of different subjects are indexed under each of them. In addition, a geographical reference is published wherever the article relates to any particular railway company, city, state or nation. Entries about electric railway companies are under the name of the city in which the main office of the company is located, but in the case of electrified sections of steam railroads, the entries appear under the name of the railroad.

In the subject index, the alphabetical method is followed, and if there is a choice of two or three keywords the one most generally used has been selected, cross references being supplied. Below will be found a list of the common keywords used in the index to this volume. This list has been subdivided for convenience into fourteen general subjects.

The headings which appear in the index are those in small type under the general classifications. The main headings printed in capitals below do not appear in the index. The list of keywords is revised from time

to time to keep the index abreast with developments.

As an example of how to use the index, if a reader wishes to locate an article on special trackwork he obviously would look in the list below at the general subject "Track." Under this caption, only "Special trackwork" could apply to the article in question. The reader would therefore refer to this keyword under the S in the body of the index.

In addition to the groups of articles covered by these headings the papers and reports from railway associations are grouped under the names of the various organizations. Proceedings of other associations and societies are indexed in general only in accordance with the subject discussed. Short descriptions of machine tools appear only under the heading "Repair shop practice; shop methods and equipment" and are not indexed alphabetically, because there is a wide choice in most cases of the proper keyword to be used.

All signed articles also are indexed by the name of the author. When the name of the author is known this provides the simplest method of locating any article.

CLASSIFIED LIST OF KEYWORDS

ACCIDENTS AND ACCIDENT PREVENTION

Accident claim department
Accidents (including wrecks)
Medical
Safety work
Storm and fire damage

ELECTRIC CARS AND SERVICE CARS

Cars (including car design)
Locomotives
Service and tower trucks
Trackless trolley

CAR EQUIPMENT

Bearings
Brakes and compressors
Current collection
Doors, car
Electrical equipment for cars (except motors)
Gears and pinions
Heaters, electric
Lighting and lighting fixtures
Motors, Electric
Resistors
Seats
Trolley wheels
Trucks
Wheels and axles

EMPLOYEES

Education
Employees
Labor
Medical
Strikes and arbitrations
Wage decreases
Wage increases
Wages and working agreements

FARES

Fare collection (including apparatus)
Fare decreases
Fare increases
Fares
Traffic investigations
Traffic stimulation

FINANCIAL, LEGAL AND STATISTICS

Accounting
Appraisal of railway property
Blanks and forms
Discontinuance of lines
Financial (methods of financing)
Franchises
Insurance, Fire
Insurance and pensions
Legal
Legislation for railways
Market conditions
Operating records and costs
Public service and regulative commissions
Statistics
Taxes

HEAVY ELECTRIC TRACTION

Heavy electric traction (general)
Locomotives

MAINTENANCE OF EQUIPMENT

Car cleaning
Lubrication
Maintenance practice
Motor buses, Practice with
Painting
Repair shop practice; cars and car equipment
Repair shop practice; shop methods and equipment
Repair shops and equipment
Stores
Tests of materials and equipment
Welding

MOTOR BUSES

Motor buses, design
Motor buses, field for
Motor buses, installations
Motor buses, jitney competition
Motor buses, practice with
Motor buses, regulation

POWER

Energy checking devices
Energy consumption
Fuels
Overhead contact system
Power distribution

POWER—Continued

Power generation
Power stations and equipment
Power transmission
Substations and equipment

STRUCTURES

Carhouses and storage yards
Power stations and equipment
Repair shops and equipment
Substations and equipment
Terminals and waiting stations

TRACK

Pavements
Poles
Rail joints and bonds
Rails
Special trackwork
Ties
Track construction
Track maintenance

TRAFFIC AND TRANSPORTATION

Advertising
Customer ownership
Dispatching
Freight and express
Interurban railways
Merchandising transportation
Publicity
Public, Relations with
Rapid transit (elevated and subway)
Schedules and timetables
Signals
Street traffic congestion
Traffic investigations
Traffic regulation
Traffic stimulation
Transportation, Metropolitan (general studies)

MISCELLANEOUS

European practice
Management
Noise reduction
Railways (general)
Snow and ice removal
Standardization
Wood preservation

INDEX TO VOLUME 65

PAGES BY WEEKS

January 3.....	1 to 48
January 10.....	49 to 84
January 17.....	85 to 126
January 24.....	127 to 170
January 31.....	171 to 208
February 7.....	209 to 244
February 14.....	245 to 282
February 21.....	283 to 322
February 28.....	323 to 360
March 7.....	361 to 394
March 14.....	395 to 436
March 21.....	437 to 492
March 28.....	493 to 530
April 4.....	531 to 568
April 11.....	569 to 606
April 18.....	607 to 644
April 25.....	645 to 682
May 2.....	683 to 718
May 9.....	719 to 754
May 16.....	755 to 796
May 23.....	797 to 836
May 30.....	837 to 874
June 6.....	875 to 914
June 13.....	915 to 956
June 20.....	957 to 1000
June 27.....	1001 to 1036

A

Accident prevention (See also Safety work):
 —Advisory Council for Chicago Surface Lines, 360.
 —A. E. R. T. & T. A. committee report, 303.
 —Arousing interest in safety reduces accidents, 854.
 —Automatic derail protects steep grades, 1008.
 —Campaign completed, Boston, 540.
 —Contest to reduce accidents, Milwaukee, 800.
 —Decrease in twelve months, St. Louis, 928.
 —Discussed at Mid-West Association meeting, 800.
 —Election day campaign, New Bedford, Mass., 34.
 —Grade crossing and highway accidents [Muir], 111.
 —Grade crossing hazard discussed by C. E. R. A., 109.
 —New accident classification urged, 776.
 —Posters to be distributed by A. E. R. A., 514.
 —Sustained efforts bring success [Williams], 689.
 —Target chart used in Detroit, 536.
 Accidents (including wrecks):
 —Head-on collision, Louisville, Ky., 1027.
 —Interborough Rapid Transit Co., 275.
 —Collision on elevated, 275.
 —Short circuit causes panic in subway, 827.
 —Jersey City, N. J., 20 passengers injured, 108.
 —Sydney, N. S. W., Runaway train, 850.
 Accounting:
 —Stores accounting, [Weston], 217.
 Advertising (See also Merchandising Transportation and Publicity):
 —Billboard, Changed monthly, San Francisco, 192.
 —Car cards and leaflets advertise stock issue, P. R. T., 503.
 —Good will ad, Atlanta, Ga., by Western Electric Co., 274.
 —Map, Electrified, To show availability of traction shipping, 929.
 —Newspaper advertising:
 —Beaver Valley Traction Co., 1028.
 —Indianapolis & Cincinnati Traction Co., 66.
 —Seattle Municipal Ry., 1028.
 —Passenger traffic increased by [Blanchard], 885.
 —Penalties suggested for bad advertising [St. Clair], 817.
 —Public utility advertising benefits, Comments on, 910.
 —Railway exhibit, Bridgeport, Conn., 1027.
 Africa:
 —Cape Electric Tramways:
 —Annual report, 353.
 Akron, Ohio:
 —Northern Ohio Traction & Light Co.:
 —Accounting demanded, 677.
 —Annual report, 975.
 —Refrigerator car electrically operated, 221.
 —Reorganization planned, 48.
 —Trip sheet for cars and buses, 849.
 —Bus question unsettled, 504.
 Albany, N. Y.:
 —United Traction Co.:
 —Annual report, 590.
 —Bus service in Remselaer, N. Y., 65.
 —Fare differences settled, 670, 708.
 —Permission sought to abandon line, 714.

Altoona, Pa.:
 —Altoona & Logan Valley Electric Ry.:
 —Concrete curb along rail reduces paving cost, 94.
 —Dasher card racks, 70.
 —Divided trolley board reduces height of cars, 195.
 —Drill grinder prolongs life of drills, 104.
 —Employees pay tribute to management, 826.
 —Property sold to Fitkin interests, 428.
 —Voluntary relief association organized, 135.
 —White steps reduce accident hazard, 220.
 American Electric Railway Accountants Association:
 —Committee activities:
 —Standard classification of accounts, chairman appointed, 417.
 —Stores accounting, 114.
 American Electric Railway Association:
 —Accident prevention posters to be distributed, 514.
 —Advisory board of management and operation review work, 782.
 —Annual convention:
 —Entertainment committee, 987; Personnel, 551.
 —Exhibit committee, 550, 551; Comments on, 837.
 —Exhibits, Space applications, 857, 874, 956; Comments on, 837.
 —Location committee report, 300.
 —Program under way, Comments on, 531.
 —Annual report of secretary, Comments on, 719.
 —Appointment of managing director endorsed, [Shannahan], 547.
 —Benefits to be derived from membership in [Hamilton], 295.
 —Broadening the work of, [Shannahan], 547.
 —Bureau of information:
 —Publications listed, 821.
 —Reports available, 69, 229, 379, 828, 739, 890.
 —Committee activities:
 —Coffin prize, Terms changed, 267; Comments on, 245.
 —Company and associate membership, 301.
 —Cooperation with manufacturers, 229, 300.
 —Education, 863.
 —Executive Committee, 68, 299, 627, 941.
 —Foreign practice, Comments on, [Mattinson], 6104; [Jackson], 621; German comments on, 341.
 —Insurance, 301.
 —Management and operation, 301.
 —National relations, 300.
 —Rapid transit, 551.
 —Special taxes, 300.
 —Valuation, 302.
 —Welded rail joints, Progress report, 988.
 —Electric railway operating statistics for 1924, 709, Comments on, 683, 719.
 —Managing director appointed, 285, 299, 550, 571; Comments on, 283, 531, [Young], 88, [Shannahan], 547.
 —Metropolitan Section:
 —Reports of meetings, 114, 287, 418, 783.
 —Midyear Meeting:
 —Comments on, 209.
 —Program, 69, 229.
 —Transportation topics discussed, 286; Comments on, 284.
 —New name proposed [Palmer], 6378; [Brown], 418; Comments on, 390.
 —New office on Madison Ave., 114, 348.
 —President Shannahan's annual statement, 154.
 American Electric Railway Claims Association:
 —Committee activities:
 —Appointments for 1925, 68.
 —Executive, 303, 628.
 American Electric Railway Engineering Association:
 —Bibliography on heavy traction prepared, 782.
 —Committee activities:
 —Appointments for 1925, 68.
 —Buildings and structures, 782.
 —Codification of power failures, 114.
 —Engineering symbols, 267, 551, 739.
 —Equipment, 193, 550, 821.
 —Executive, 302.
 —Heavy traction, 782.
 —Power generation and conversion, 514.
 —Power transmission and distribution, 478, 988.
 —Purchases & stores, 114, 988.
 —Unification of car design, 701.
 —Way committee, 68, 587, 941.
 —Welded rail joints, Repeated impact tests, 552, 302.
 —Wood preservation, 154, 663.
 American Electric Railway Transportation and Traffic Association:
 —Committee activities:
 —Accident prevention, 303.
 —Appointments for 1925, 68.
 —Executive, 302, 663.
 —Relief of traffic congestion, 393.
 —Selling transportation, 300.
 American Engineering Standards Com. (See Standardization):
 —American Institute of Electrical Engineers:
 —Annual meeting, Report, 816.
 —Locomotive motor design discussed, 266.
 —American Railway Engineering Association:
 —Annual convention, Proceedings, 475.
 —Welded rail joint committee meeting, 662.
 —American Society for Testing Materials:
 —Specifications changed, 546.

American Welding Society:
 —Annual meeting, Report, 698.
 Anderson, Ind.:
 —Union Traction Company of Indiana:
 —Annual Report, 831.
 —Bus program, 865.
 —Receiver appointed, 42, 79.
 —Reorganization rumored, 748.
 Appleton, Wis.:
 —Wisconsin Traction, Light, Heat & Power Co.:
 —Fares reduced, 119.
 Appraisal of Railway Property:
 —Age-life method of valuation described [Langland], 697.
 —Atlanta, Ga., Valuation figures questioned, 317.
 —Baltimore, Md., Valuation case, 792, 832, 871, 909, 950, 1032.
 —Buffalo, N. Y., City's attitude, 868.
 —Chicago Surface Lines, Valuation figures, 201.
 —Cincinnati, Ohio, Valuation recommended, 537.
 —Duluth, Minn., Valuation figures, 104; Comments on, 532.
 —Minneapolis, Minn., Valuation proceedings, 430, 522, 910, 950; Comments on, 532.
 —New Orleans rate base reduced, 748.
 —New York State Rys., valuation reduced, 356.
 —Oakland, Cal., Valuation approved by I. C. C., 43.
 —Richmond, Va., Report, 870.
 —St. Paul, Minn., Valuation proceedings, 430, 522, 749, 910, 950, Comments on, 532.
 —Seattle, Wash., City valuation raised, 833.
 —Tax appraisals cut in Indiana, 952.
 —Valuation committee report, A. E. R. A., 302.
 —Valuation practice must be clarified, Comments on, 532.
 —Washington, D. C., Capital Traction Co., Value increased, 951.
 Arbitration (see Strikes and Arbitrations):
 —Association of Public Utility Secretaries:
 —Annual meeting, 266.
 Athens, Ga.:
 —Athens Railway & Electric Co.:
 —Fare increase, 237.
 Athol, Mass.:
 —Athol & Orange Transportation, Area:
 —Purchase and operation of portion of Northern Massachusetts St. Ry., 59.
 Atlanta, Ga.:
 —Atlanta Northern Ry.:
 —Annual report, 676.
 —Fare increase controversy, 829, 947.
 —Marietta line resumes service, 197.
 —Marietta line, Service suspended, 123, 160.
 —Georgia Railway & Power Co.:
 —Annual report, 791.
 —Anti-jinney law constitutional, 519.
 —Arbitration averts strike, 608.
 —Car order, Specifications, 530; Design details, 695.
 —Flexible rates recommended, 115, 558.
 —Motor bus service installed, 482.
 —Operating statistics, Two years, 55.
 —Plans for increased traffic, 311.
 —To control transportation in Atlanta, 384.
 —Valuation figures questioned, 317.
 —Wage increase granted by arbitrators, 744, 827; Dismissing arbitrator's digest, 1027.
 —Jinney regulation, 234.
 —Traffic investigation, Beeler report, Details, 55, 136, 181; Comments on, 209.
 Attleboro, Mass.:
 —Interstate Consolidated Street Ry.:
 —Engineers buy road, 277.
 Auburn, N. Y.:
 —Auburn & Syracuse Electric R.R.:
 —Disk arrow used to remove snow from streets, 375.
 Aurora, Ill.:
 —Aurora, Elgin & Fox River Electric Co.:
 —Time-table carries local information, 341.
 —Chicago, Aurora & Elgin R.R.:
 —Fixture holds axle bearing cap for drilling, 107.
 —Wage increase, 1030.
 Austria:
 —Electrification progress, 807, 994.
 Australia:
 —Sydney, N. S. W.:
 —Runaway train, 850.
 Automobiles (see Motor buses):
 Axles (see Wheels and axles):

B

Babbitt (see Repair shop practice and Bearings):
 Baltimore, Md.:
 —United Railways & Electric Co.:
 —Articulated and multiple-unit cars, 377.
 —Bus competitor purchased, 488.
 —Bus outings and tours, 815.
 —Concrete poles manufactured, Details [Wysocki], 691.
 —Fender removal reduces accidents, 34.
 —Instructions for repairing underground cables, 67.
 —Literature distributed to aid safety work, 536.
 —Loading platforms, Warning lights mark, 544.
 —Park tax not in lieu of other taxes [Palmer], 416.
 —Radio broadcasting, Program, 1036.
 —Sand drying plant, 619.

C

- Baltimore, Md. (Cont.):
Track maintenance organization, *465.
Traffic decline explained, 861.
Train operation, Details, *577.
Valuation proceedings, 792, 832, 871, 909, 950, 1032.
Work car crews have comfortable quarters, *859.
- Washington, Baltimore & Annapolis Electric Ry.:
Annual report, 713.
Color of cars changed, *939.
Insurance, Cooperative group, for employees, 883.
Parallel transmission lines insure power supply, *852.
Sale of road rumored, 951.
Sand outlet attached to trucks, *1014.
Span wires replace bracket arms, *552.
Triple valves, Jig for grinding, *515.
- Bangor, Me.:
—Bangor Railway & Electric Co.:
Portable substation, Details, *53.
Track construction, Details, *333.
- Bearings (see also Lubrication):
—Armature:
Maintenance of, [Whitney], *451.
Self-centering chuck for [Wood], *470.
—Armature and Axle bearings, Undersize and oversize, Use of [Pontius], 618.
—Axle:
Dowels hold for drilling, *105.
Finished in small planer, [Reiff], *106.
—Babbitting increases life of, *943.
—Babbitting practice, Minneapolis, *93.
—Designs used on modern car trucks [Adams], *925.
—Fitted bearings have long life, Method, 553.
—Fixture holds cap for drilling, *107.
—Lathe chuck for, *344.
—Repair practice, Interborough, *440.
—Roller, For line shaft hangers, 199.
—Welding and boring saves costs [An Ex-Master Mechanic], *697.
- Beaver Valley Traction Co. (see New Brighton, Pa.)
- Beech Grove, Ind.:
—Beech Grove Traction Co.:
Foreclosure sale ordered, 951.
- Belgium:
—Brussels:
International Chamber of Commerce, Automotive discussion, 514.
- Beloit, Wis.:
—Beloit Traction Co.:
Fares increased, 072.
- Berlin (see Germany):
- Biddeford, Me.:
—Biddeford & Saco, R. R.:
Ice cutter mounted on truck frame, *421.
- Binghamton, N. Y.:
—Binghamton, Railway:
Fare increase, 70, 117.
Reorganization plans under way, 791, 864.
- Birmingham, Ala.:
—Birmingham Electric Co.:
Modern equipment reduces reconstruction costs [Taurman], *537.
Yard tracks rebuilt, *688.
- Blanks and forms:
—“Bad order” cards for colls, *515.
—“Cars to be repaired” form, N. Y. C., *959.
—Combined service report form, Los Angeles, *659.
—Dispatching order form, *842.
—Employee instruction progress forms, Denver, *657.
—Fare box repairs, Forms, *99.
—Inspection report forms, Philadelphia, *95; Kansas City, *339.
—Line maintenance forms, Toronto [Nellid], *763.
—Payroll forms, Boston, *839.
—Power-saving chart, Denver, Colo., *408.
—Pull-in record, Detroit, *770.
—Standard invoice, purchase order and inquiry, 169.
—Shop reports, Texas, *454.
—Tire service record, Los Angeles, *449.
—Track inspection, *461.
—Trip sheet for cars and buses, *849.
- Bonbright Prize:
—Winners selected, 990.
- Bonding (see Rail joints and bonds).
- Bonner Springs, Kans.:
—Kansas City, Kaw Valley & Western Ry.:
Foreclosure proceedings, 1031.
- Book reviews:
—Bus operating practice by Hauer and Scragg, 601.
—Connecting and testing direct-current machines, by F. A. Annett and A. C. Roe, 432.
—Electric railway practices in 1924, by H. H. Norris, 952.
—EMF electrical year book for 1925, by Frank H. Bernhard, 750.
—Facts and figures of the automobile industry, by N. A. C. of C., 953.
—Growth of American trade unions, 1880-1923, by Leo Wolman, 600.
—Journal of Land and Public Utility Economics (A. W. Shaw Co.), 204.
—Municipal ownership, by Carl D. Thompson, 953.
—Overhead line construction (Fahrleitungsanlagen für Elektrische Bahnen), by F. W. Jacobs, 432.
—Proceedings of national association of railroad and utilities commissioners, 1924, 952.
- Book reviews (Cont.):
—Publicity—Some of the things it is and is not, by Ivy L. Lee, 750.
—Railway electrification, by H. F. Trewman, 601.
—Report to City of Atlanta, Ga., on plan for local transportation, by John A. Beeler, 750.
—Skinner's mathematical theory of investment by E. B. Skinner, 600.
—Stinnes and his enterprises, by Paul Ufermann and Carl Hüglin, 204.
—Subway nickels, New York City's transit problems, by Harry A. Gordon, 432.
—The automobile: Its province and problems, 204.
- Boone, Iowa:
—Fort Dodge, Des Moines & Southern R. R.:
Bus subsidiary organized, 520.
Fares increased, 869.
Financial status, 909.
- Boston & Maine R. R.:
—Annual report, 563.
—Branch line abandonments, Comments on, 570.
—Bus operating plans, 593, 828, 948.
- Boston, Mass.:
—Boston Elevated Railway:
Accident reduction campaign, 185; completed, 540.
Annual report, 238, 560.
Apron prevents riding on bus bumpers, *304.
Arbitration proceedings, 826, 904, 940; Dissension over method, 863, 1024; Comments on, 958.
Bus fare increase, 805.
Car cleaning methods [Johnson], 897.
Employee citizens can be discharged, 161.
Educational program, 256, 744; Comments on, 245, 720.
Financial reports, Monthly, 356, 749.
Garage, Forest Hills, Details, *303.
Paint shops, Details, *173.
Payrolls prepared by machines, *839.
Public control extension, Two reports filed, 158; Comments on, 128.
Public, Control, Results with, [Curley], 548.
Public ownership investigation committee named, 830.
Quarterly dividend declared, 487.
Skip-stop plan speeds up service, 38, *888.
Squaring shear, Power-driven, *420.
Telephone dispatching saves time of work cars, 144.
Tons of copper in use, 614.
Traffic fluctuations, *488.
Traffic statistics, November, 42.
Training school, Details, *373.
Transparent numbers displayed on cars, *105.
Vestibule area increased, Methods, *332.
Welding practice [Steward], 699.
Wiring and fire protection, Everett shops, *499.
- Eastern Massachusetts Street Railway:
Air cylinder presses out bearings, 741.
Air tanks, Hydraulic testing, *741.
Annual report, 635.
Arbitration sought by employees, 864, 946.
Boston-Lowell bus service discontinued, 745.
Branch line abandonments, Comments on, 570.
Bus privilege sought, 593.
Car bodies raised with sling, *000.
Car painting methods, Details [Hurlock], *907.
Rail joint failures reduced, 858.
Rail joint welding, Training and inspection, [Walker], 698.
Reconditioning motors to increase bearing mileage, *473.
Testing circuit breakers [Hurlock], *90.
Time table and map on bulletin board increases traffic, *222.
Track reconstruction machinery, *186.
Wage controversy, 746.
- Boston & Worcester Street Ry. (see Framingham, Mass.)
- Brakes and Compressors:
—Air brakes, Electro-pneumatic, Illinois Central, *211.
—Air compressor, Valveless, *775.
—Brakes on modern car trucks [Adams], *925.
—Emergency valve for one-man cars, *62.
—Illinois Traction System cars, *51.
—Repair practice, Interborough, *440.
- Bridgeport, Conn.:
—Additional bus rights sought, 558.
- Brooklyn, N. Y. (see New York City)
- Budget system (see Financial).
- Buffalo, N. Y.:
—Buffalo & Erie Ry. (See Erie, Pa.):
—International Railway Co.:
Abandonments denied by commission, 340.
Annual report, 432.
Conference on controversy with city, 480, 1024.
Fare increase controversy, 236, 383, 517, 631, 863, 990.
Fares to Tonawanda reduced, 427.
Mayor attacks management, 423.
One-man cars approved, 35, 116.
Service-at-cost contract suggested, 667.
Service curtailed account operating deficits, 312.
Valuation controversy, 868.
Wage increase granted, 237.
- Bureau of Mines:
—Transferred to Department of Commerce, 914, 955.
- Business paper of the future [McGraw], 228.
- California Electric Railway Association
—Superintendent's committee:
Operation discussed, 856.
- California, State of:
—Utility measures before legislature, 199.
- Canadian Electric Railway Association:
—Annual meeting, Report, 079.
- Capital Traction Co. (see Washington, D. C.)
- Car cards (see Publicity).
- Car cleaning (see also Maintenance Practice):
—Methods of Boston "L" [Johnson], 897.
Car design (see Cars).
- Car Heaters (see Heaters, Electric):
Carhouses and Storage Yards:
—Yard tracks rebuilt, Birmingham, *688.
Car Lighting (see Lighting and Lighting Fixtures).
- Cars (including Car design):
—Articulated and multiple-unit cars, Baltimore, *577.
—Articulated trains, Germany, *259.
—Automatic treadle door, Dallas [Meriwether], *227.
—Berlin, used on suburban electrified lines, Design, *503.
—Brooklyn new cars [Hodges], 806, *1003.
—Census report on kinds used, 305; Comments on, 284.
—Design changed to reduce loading time [Williams], *191.
—Designs, Relation to operating conditions [Metcalfe], 982.
—Detroit, Mich., Specifications, 492.
—Developments in design and weight [Gass], 938.
—Discussed by New England Street Railway Club, 265.
—Divided trolley board reduces height, *195.
—Duluth Street Railway, new cars ordered, Specifications, 394.
—Gary Street Ry., Specifications, 606.
—Grand Rapids sample test cars, Designs, Details, *529, *721, *767, *807; Comments on, 719.
—Illinois Central cars for Chicago electrification, Details, *211.
—Light weight interurban:
Being tried out on Philadelphia & Western Ry., Details, *133.
Features discussed [Clardy], 152.
Discussed by New York Electric Ry. Assn., 146; Comments on, 172.
Illinois Traction System, Results, [Bosenbury], 149; Comments on, 172.
—Light-weight, Show saving, *726.
—Model cars of 1930, [Berry], 780.
—Monel metal side sheets satisfactory, Dayton, Ohio, *730.
—Multiple-unit, Paris electrified lines, *370.
—New door arrangement, Berlin, *310.
—New features of Atlanta cars, Details, *693.
—Noise reduction in car operation [Williams], *705.
—One man:
Approved in Buffalo, 35, 116.
Approved in Little Rock, Ark., 273.
Counter-entrance trailers converted to, *309.
Cleveland, Ohio, Use of, 990.
Denver, Colo., Successful, *263.
London, England, Single-deck tramcar, *58.
Newark, N. J., Details, *363.
Observation interurban cars, Illinois Traction System, Details, *51.
One-man, Two-man rebuilt cars, Ottawa, *407.
Single-truck, convertible, Third Avenue Railway, Details, *877.
Worcester, Mass., Sanctioned by State Department of Public Utilities, 36.
—Orders during 1924 analyzed, Trend shown, Statistics, 21; Comments on, 2.
—Painting (see Painting).
—Passenger equipment, Dallas-Denton line [Cook], *647; Comments on, 646.
—Pittsburgh Ry. new cars, specifications, 717.
—Refrigerator car, Details, Akron, Ohio, *221.
—Safety (see Cars, One-man).
—Safety valve on door engines prevents slamming, *900.
—Seats rearranged, Los Angeles, *545.
—Semi-steel cars used in Berlin, Details, *689.
—Specifications, Knoxville, Tenn., 568.
—Style in design, [Gordon], 936; Discussion, [Klippenberger], 937; Comments on, 1001.
—Treadle cars, Toronto, Features of [McRae], 983.
—Trucks, Modern, Design and development [Adams], *925.
—Types of cars in use, 1924 statistics, 367.
—Vestibule area increased, Boston "L," *332.
—Window opener combined with sash lock, *310.
- Census report, Electric railways, Details, 305; Comments on, 284.
- Central Electric Railway Association:
—Annual meeting, Report, 109, 111.
—Committee activities:
Executive, 938.
—Officers elected for 1925, 110.
—Summer meeting, Report, 931.
- Central Electric Railway Master Mechanics Association:
—Committee progress reports, 940.
—First regular meeting, 627.
—Organization, 477; Comments on, 439.
Chamber of Commerce of the United States:
—Election of directors, Comments on, 647.
—Officers elected, 856; Comments on, 494.
—Transportation and city planning discussed, 819.
—Work of, Comments on, 838.

- Charles A. Coffin Prize:
—Conditions changed, 247; Comments on, 245.
—Award for entering Coffin competition, Comments on, 258.
- Charleston, S. C.:
—Charleston Consolidated Railway & Light Co.:
Meters used as reverse-current relays, 923.
Paving restrictions modified, 947.
- Chattanooga, Tenn.:
—Tennessee Electric Power Co.:
Car cards advertise service, *263.
Signal failures decreasing, 774.
- Chicago, Aurora & Elgin R.R. (See Aurora, Ill.)
- Chicago, Ill.:
—Chicago City Ry.:
Fares reduced, 40.
—Chicago Motor Coach Co.:
Operating statistics, 736.
—Chicago Rapid Transit Co.:
Annual report, 748.
Five-mile extension opened, Details, *583.
Improvements held up by city, 947.
Wage negotiations, 1020.
—Chicago North Bend & Northern Indiana Ry.:
Fare increase, 386.
—Chicago Surface Lines:
Accidents decreased 23 per cent., 313.
Advisory Council for accident prevention, 460.
Annual report, 522.
Bridges crossing protected by electric derail, *225.
Bus operation planned, 1020.
Carbon arc welding [Wolfe], 699.
Cyanide hardening process, Details, *337.
Carhouse robbery, Comments on, 396.
Headway recorders check crossing delays *251.
Maintenance of equipment [Shaughnessy], 509.
Safety work, 37.
Valuation figures, 201.
Wago contract renewed, 802, 946.
- Illinois Power & Light Co.:
Annual Report, 598.
Franchise for Decatur approved, 949.
Wage agreements, Railway employees, 863.
- Illinois Traction, Inc.:
Articles found in fare boxes, *62.
Suburban cars, New, Details and design, *51.
Light-weight interurban cars, Results [Bosenbury], 149.
Locomotives, Articulated, Details, *187.
Motor maintenance, 771.
Petitions to handle freight in St. Louis, 162.
Track maintenance practice [Catherman], 510.
—Municipal ownership controversy, 35, 75, 158, 234, 271, 350, 383, 426, 481, 591; Comments on, 172, 608.
—National Motorbus Association organized, 1019.
—Subway expenditures, 79.
—Traction issue may go before legislature, 198, 830.
—Transportation ordinance to be voted on, *555; defeated, *591.
—Unified transportation system planned, *360; Comments on, 361.
- Chicago, Milwaukee & St. Paul R. R.:
—Auxiliary bus service installed, 993.
—Comparison of costs on electrified and steam operated lines, 338.
- Chicago, North Shore & Milwaukee R. R. (See Highwood, Ill.)
- China:
—Peking:
Electric railway in operation, 120.
—Shanghai Electric Tramways:
Trackless trolley expansion, *604.
- Cincinnati, Ohio:
—Cincinnati & Dayton St. Ry.:
Annual report, 869.
—Cincinnati Street Ry.:
New franchise agreement, 519, 945, 1027.
Reorganization planned, 235.
—Cincinnati Traction Co.:
Traffic declines, 825.
—Extra appropriation approved, 199.
—Franchise controversy, 77, 118, 519, 945.
—Valuation of railway properties recommended, 557.
- Circuit breakers (see Electrical equipment for cars).
- City Railway (See Dayton, Ohio)
- Cleveland, Ohio:
—Cleveland Railway:
Automatic substations, Experience and costs, 931.
Buses to be installed, 482; Routes approved, 594.
Cars ordered, Specifications, 322.
"Closed shop" agreement with employees void, 591.
Co-ordination and terminal problem, Plans, 555.
Cushion ties used in track construction, *140.
One-man car operation limited, 990.
Report for year, Shows new financing needed, 203.
Special overhead construction during grade elimination [Scott], *880.
Strike question defeated by vote, 785; Comments on, 756.
Wage controversy, 591, 630, 672, 705, *743, 785.
—Financing of bus purchases arranged, 557.
- Lake Shore Electric Ry.:
Annual report, 489, 870.
Freight delivered promptly to Toledo, 1025.
—Transit survey proposed, 479.
Coal (see Fuels and Market conditions).
- Coffeyville, Kans.:
—Union Trac. Co.:
Service increased to meet competition, 483.
- Colorado Springs, Colo.:
—Colorado Springs & Interurban Ry.:
Economies proposed, Engineers report, *885.
- Columbus, Newark & Zanesville Electric Ry. (See Zanesville, Ohio).
- Coffin Foundation (see Charles A. Coffin).
- Columbus, Ga.:
—Columbus Electric & Power Co.:
Accidents reduced, 8-yr. record, 377.
- Columbus, O.:
—Columbus Railway, Power & Light Co.:
Annual report, 599.
Band saw expedites metal cutting, [Hott], *107.
Carhouse converted into a shop, *456.
Financial readjustment, plans, 42.
Jigs and dies, Storage, 470.
Jigs expedite drilling, *335.
Millwork stored in racks, *70.
Motorman's valve, Apparatus eliminates sticking, [Hott], 156.
Personnel changes, *203.
Refinancing plan approved, 317.
—Franchise discussion revived, 272.
- Community Traction Co. (see Toledo, Ohio).
- Connecticut Co. (see New Haven, Conn.)
- Conspectus of indexes, 165, 350, 524, 635, 975, 832, 1032.
- Conventions:
—Calendar of meetings helpful [Willis], 621; [Paul], 621.
- Cranes:
—Crawling tractor crane, Improved type, *626.
—Magnetic time controller for, 563.
—Overhead crane for car bodies, *959; Comments on, 957.
- Cuba:
—Havana Electric, Railway Light & Power Co.:
Annual report, 871.
- Cumberland County Power & Light Co. (See Portland, Me.)
- Current collection (see also Overhead contact system).
—Device for current-collecting: [Delf and Tongue], 779.
- Customer ownership (see also Public Relations with).
—Philadelphia, Pa., Stock sale, 354, *503.
—Reading, Pa., campaign, 105.
—St. Joseph, Mo., Second campaign, 355.
—Toledo, Ohio, Advantages suggested, 923.
—Winnipeg, Man., stock sale, 388, 566.

D

- Dallas, Tex.:
—City's right to regulate rates upheld by court, 705.
—Dallas Ry.:
Cabinet for tools and supplies [Brown], *942.
Clamp, Pneumatic mortising, For gluing doors or sash [Brown], *974.
Coffin award to be tried for, 556.
Compressor cylinders, Relining practice, 976.
Fare controversy, 117, 159.
Transportation situation [Gordon], *1009.
Pull-ins reduced, 473.
Treadle-door car successful [Meriwether], *227; [Plummer], 781.
- Texas Interurban Ry.:
Dallas-Denton line electrified, Details, [Cooke], *647; Comments on, 646.
Transportation situation [Gordon], *1009.
—Utility relations in, 273.
- Danbury, Conn.:
—Danbury & Bethel St. Ry.:
Bondholders take over property, 121.
Road sold, 201.
- Davenport, Ia.:
—New railway headquarters, 48.
- Tri-City Railway of Iowa:
Compromise averts strike, 991.
Lower fare continued temporarily, 162.
Time-table for public distribution, *304.
Union willing to arbitrate, 946.
- Dayton, Ohio:
—City Railway:
Emergency equipment in street boxes, 332.
Honor roll reduces accidents, 252.
Mechanical ties used, Details [Howell], *190.
Monel metal side sheets prove economical, *730.
Repairing gear case arms, *740.
Special wheel shop, *625.
- Dayton Street Ry.:
Controversy with former employees re bus route, 829.
- People's Railway:
Center-entrance trailers converted to one-man cars, *309.
- Denver, Colo.:
—Denver & Northwestern Ry.:
Reorganization, 709.
- Denver Tramways:
Bus subsidiary organized, 519.
Examining and teaching platform men, *657.
Fare increase, Crown Hill line, 41.
One-man cars successful, *263.
Power-saving Chart, *408.
Progress since receivership, 638.
Reorganization, 277, 709, 872, 952, 996; Comments on, 838.
Straps removed from all cars, Comments on, 128.
To compete for Coffin prize, *631.
- Denver, Colo. (Cont.):
Track maintenance equipment mounted on trucks, *155.
Wheel maintenance practice, *327.
Woman as assistant instructor, 307.
- Depreciation (see Appraisal of railway property or Financial).
- Des Moines, Ia.:
—Des Moines City Ry.:
Motor suspension, Improved type, *510.
Pit tool boxes reduce time of bus repairs, *469.
Sand boxes on buses, *545.
Truck standardization reduces maintenance, 665.
- Detroit, Mich.:
—Department of Street Railways:
Acid pot saves material, *624.
Acquisition of more lines considered, 749.
Attitude of Journal toward, Comments [Schram], 6889.
Blue envelope to employees mean commendation, 550.
Buses, double-deck, Details, *753.
Bus fares may be reduced, 233.
Bus for mass transportation, Test proposed, 905.
Bus line installed, 313.
Bus order blocked, 74.
Bus service installed as feeders for trolleys, 75.
Cars ordered, Specifications, 492.
Centralized transit control, Comments on, 837.
Clamp for holding armatures, *343.
Clanking armature cores by sand blast, *473.
Contracta subject to Council's approval, 423.
Defect made up by business men, 803.
Dipping and baking armatures, 664.
Employees withdraw demands, 107.
Gasoline rise as trolley sales argument, *371; Comments on, 362.
General manager dismissed, 945; Comments on, 915.
Increasing speed of car loading at terminals [Williams], *191.
Meetings open to public, 1023.
Model bus as experiment, Design, 681.
Mt. Elliott line, Installation, 304.
Municipal operation, Comments on, 756, 915.
Pull-ins decreased by competition, *770.
Radio show, Advertising at, 37.
Rail and bus operation tested, *855.
Respirator protects workmen while spray painting, *702.
Roofed loading station erected, Details [Peterson], *653.
Rubber bushing for motor leads, *624.
Safety work, Politeness emphasized, *827.
Service stripes for trainmen, 262.
Sign printing, Silk screen, [Williams], *261.
Spraying varnish inside motor frames, *515.
Target chart used in accident prevention work, *536.
Trackless trolleys, tested, *215.
Traffic congestion studies, 811.
Traffic survey, Methods, *129; Comments on, 127.
Truck squaring device [Ferguson], *420.
Wage increase granted, 785.
Wheel maintenance practice [Colby], *463.
Worn wheel flangers built up by welding, 108.
- Detroit United Ry.:
Annual report, 524.
Bus service popular, Ann Arbor, Mich., 424.
Fares reduced, 595.
Interurban passengers transfer to buses, *685.
Receivers appointed, 431, 485.
Receivership a protective measure, 526, 713.
Reorganization plans, 748, 996; Comments on, 1001.
Traffic survey to be made, 900.
- Extension of railway lines, Plans, 117.
—Jitneys attacked, 199.
—Rapid transit plan, 629.
—Urban transit must be centralized, 825.
- Dick Prescott, *100, *343, *471, *823, *773, *975.
- Discontinuance of lines:
—Abandonment offset with extensions, 534.
—Abandonment of unprofitable lines, Comments on, 570.
- Arkansas City-Winfield Northern Interurban Ry., 997.
—Black River Traction Co., 1029.
—Connecticut Valley St. Ry., Greenfield, Mass., *50.
—Danville & Sunbury Transit Co., 80.
—Furnishing service on abandoned routes, Comments on, 570.
—Hornell Traction Co., Hornell, N. Y., One mile line, 390.
—Nassau County Ry., 80.
—Nevada County Traction Co., 204.
—Northern Mass. Street Ry., *59.
—Phoenix Ry. to cease operations, 712.
—Review of 1924, Statistics, 17, 20, 31.
- Dispatching:
—Single-track interurban operation [Rollins], *730.
—Telephone, New Haven & Shore Line Ry., *458, *842.
—Telephone, with supervisory control, Texas Interurban [Cooke], *647; Comments on, 646.
—Train, dispatching, Interborough, Details, *917.

Abbreviations: *Illustrated, c Communications.

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX

Doors, Car:
—Collapsible arm for door engines, *72.
—Controller for rear and front operation, *1020.
—Folding, Grand Rapids sample car, *721
*807; Comments on, 719
—Folding, On Third Avenue Ry. one-man cars, *877.
—Safety valve prevents jamming, *900.
—Sliding doors, Berlin, Germany, *310, *688.
—Sliding doors on New Atlanta cars, *695.
—Treadles:
Dallas [Meriwether], *227, 776 [Plummer], 781.
Grand Rapids sample car, *767.
London, England, *58.
Toronto, Features of [McRae], 983.
Duluth, Minn.:
—Duluth Street Ry.:
Bus lines purchased, 632.
Flat six-cent fare allowed, 73.
New cars ordered, Specifications, 304.
Valuation of property fixed, 164.
—Duluth-Superior Traction Co.:
Annual report, 625.
Dividend action deferred, 995.
Financial readjustments increase earnings, 750.

E

Eastern Massachusetts Street Railway. (See Boston, Mass.):
East St. Louis, Ill.:
—East St. Louis & Suburban Ry.:
Annual clean-up campaign, 483.
Fare increase sought, 806.
Education:
—Boston, Training school for employees, *373.
—Departmental group conference plan, Boston, Mass., 256; Comments on, 245.
—Pittsburgh, Educational building, Comments on, 1002.
—Public utility courses established.
College of the City of New York, 275.
Indiana University, 352.
—Study must be continued after graduation; Comments on, 958.
—University utility courses, 661.
Education of employees. (See Employees):
Elgin Avenue Railroad Co. (See New York City):
Electrical equipment for cars (except Motors):
—Articulated trains, Germany, *259.
—Atlanta, New cars, *695.
—Buzzers, Interrupter unit for, *106.
—Car wiring tests, Interborough, *440.
—Circuit breakers:
Free handle, 824.
Improved type, 666.
New York Central locomotives, *102.
Shock proof (Roller-Smith), 72.
Water rheostat for testing [Hurluck], *90.
—Illinois Central cars for electrification service, *211.
—Illinois Traction System cars, *51.
—Interurban cars, light-weight [Clardy], 152.
—London, England, One-man tramcars, *58.
—One-man, two-man rebuilt cars, Ottawa, *407.
—Philadelphia & Western Ry., Interurban car, Details, *133.
—Third Avenue Ry., One-man cars, *877.
Electric Bond & Share Co.:
—Utility holdings relinquished, 42.
Electric Ry. Association of Equipment Men, Southern Properties:
—Maintenance discussed, 347; Comments on, 323.
Electrification (see Heavy electric traction):
Elevated railways (see Rapid transit):
Elmira, N. Y.:
—Elmira Water, Light & Railroad Co.:
Fares increased, 830.
Emergency Wagons (see service and tower truck):
Employees (see also Labor, Strikes and Arbitrations and Wages):
—Accident awards, San Diego, 274.
—Accident elimination contest, Brooklyn [Hodge], 890.
—Annual clean-up campaign, Prizes awarded, E. St. Louis, Ill., 483.
—Benefit association organized, West Chester, Pa., 991.
—Blue envelopes for commendation, Detroit, 656.
—"Courtesy" bulletin from general manager, New Brighton, Pa., 190.
—Discipline, Essentials of [Macy], 148.
—Duties in train operation, Interborough, Details, *917.
—Educating in mechanical department, 347; Comments on, 323.
—Educational program, Boston, Mass., 250; 744; Comments on, 245, 720.
—Employee stock ownership improves morale, [Esch], 290.
—Examining and teaching platform men, Denver, *657.
—Honor roll system reduces accidents, Dayton, Ohio, 252.
—Length of service, Washington, D. C., 258.
—Loan Association successful in St. Louis, 39.
—Payrolls prepared by machine, *839.
—Power saving chart stimulates interest, *408.
—Recreational buildings to be constructed, Pittsburgh, 830.
—Relief Association organized, Altoona, Pa., 135.
—Safety record, Beaver Valley lines, 852.
—Service stripes for trainmen, Detroit, 262.
—Training for one-man car operation, Newark, N. J., *363.
—Training of welders [Walker], 698.
—Training school for, Boston "L", Details, *373.
—Woman as assistant instructor, Denver, 367.
—Work car crews, Quarters provided, Baltimore, *859.

Energy consumption:
—Brooklyn new cars reduce, *1003.
Engineering Foundation:
—Tenth annual meeting, 348.
Engineers:
—Manufacturers' Can help solve maintenance problems, 418.
England (see Great Britain).
Erie, Pa.:
—Buffalo & Erie Ry.
Equipment trust issue, 44.
Operation on paying basis, 318.
Eureka, Cal.:
—Eureka Municipal Ry.
Money needed for reconstruction, 304.
European Practice (see also under names of different countries):
—A.E.R.A. committee report, Comments on [Mattinson], c104, 341, [Jackson], 621.
—Graphs of tramway statistics, *145.
Evansville, Ind.:
—Southern Indiana Gas & Electric Co.:
Annual report, 749.
Tornado causes damage, 517, 594.
Everett, Wash.:
—Pacific Northwest Traction Co.:
Fares reduced, 237.
Express (see Freight and Express).

F

Fairmont, W. Va.:
—Monongahela-West Penn Public Service Co.:
Operations enlarged, 274.
Fare collection:
—Fare boxes illuminated, Rochester, *737.
—Fare boxes, Inspection and repair, St. Louis, *99.
—Lock for fare boxes, 860.
—Methods of Public Service Ry. of N. J., *363.
—Pay-as-you-leave system, Oakland, Cal., 904.
—Pay-as-you-pass cars successful, Brooklyn, *1003.
—Signs illuminate fare boxes, *845.
—Station employees collect, Interborough, *917.
—Sunday pass:
Installed, Beaver Valley, *889.
Successful in Pittsburgh, Pa., *366.
Use extended, 380.
—Tickets discontinued, Youngstown, Ohio, 800.
—Ticket machines, Automatic, London, 867.
—Token holders popular, Philadelphia, *620.
—Transfer use reduced, N. Y. & Queens Co. Ry., 377.
—Turnstile, Folding arm, *1022.
—Weekly pass:
Bakersfield, Calif., 903.
Kennebunk, Me., 483.
Leominster, Mass., Trial, 275.
Levia, Que., 993.
Mansfield, Ohio, 830.
Pittsburgh, Unlimited riding, 829.
Pottsville, Pa., 866.
—Zone check system used on Pennsylvania-Ohio interurban lines [Best], *143.
Fare decreases:
—Appleton, Wis., 110.
—Chicago City Railway, 40.
—Connecticut Co. bus fares, 237.
—Detroit United Ry., 595.
—Everett, Wash., 237.
—Great Britain, 867.
—Indianapolis & Cincinnati Traction Co., 480.
—International Railway, Buffalo, N. Y., 427.
—London Underground Ry., 747.
—Public Service Ry., Newark, 595.
—Rockford, Ill., 900.
—Washington, Pa., 860.
—Worcester, Mass., 672.
Fare increases:
—Ames, Iowa, 866.
—Athens, Ga., 237.
—Beloit, Wisc., 672.
—Binghamton, N. Y., 117.
—Boston Elevated Ry., Bus fares, 865.
—Buffalo, N. Y., 383.
—Cedar Rapids, Ind., 1030.
—Chicago, South Bend & Northern Indiana Ry., 386.
—Cincinnati, Ohio, 945.
—Denver Tramway, Crown Hill line, 41.
—Elmira, N. Y., 830.
—Fort Madison, Iowa, 708.
—Honolulu, Hawaii, 119.
—Madison, Wisc., 76.
—New York & Stamford Ry., 830.
—New York State Rys., Interurban rates, 708.
—Omaha, Neb., 906, 989.
—Plattsburgh, N. Y., 949.
—Pomona, Cal., 1929.
—Texarkana, Ark., 993.
—Virginia Railway & Power Co., 830.
—Waterloo, Iowa, bus fares, *707.
—Wilmington, N. C., 860.
Fares:
—Adjusted according to expenses, Pittsburgh, *799; Comments on, 797.
—Atlanta, Ga. controversy, *181, 558, 947.
—Beaver Valley bus rates, *851.
—Binghamton, N. Y., Increase asked, 76.
—Dallas, Tex., Controversy, 117, 159.
—Detroit, Bus fares may be reduced, 233.
—Differential fares, Advantages [Jackson], 980.
—Duluth, Minn., Six-cent fare allowed, 73.
—Fare adjustments arouse interest, Pittsburgh, Pa. [Fitzgerald], 986.
—Illinois Central seeks increase in commutation rates, 161.
—International Ry., Buffalo, N. Y., Controversy, 517, 990.
—Newark, N. J., Readjustment, 557.
—New York City, Five-cent fare report, 903; Comments on, 876.
—New York City rate case, Supreme Court decision, 862, 989.

Fares (Cont.):
—Philadelphia controversy, 669, 789, 862, 1024.
—Poughkeepsie, New schedule effective in, 746.
—Shawnee, Okla., Reduced fare books authorized, 559.
—Shreveport, La., denied increase, 609.
—Trend in 1924 [Richey], 15; Comments on, 3.
—Twin City rate suit, Case reviewed, 831.
—Twin City valuation findings may require fare increase, 430.
—Virginia State Corporation Commission controls rates, 233.
—Youngstown, Ohio, Weekly ticket plan to be tried, *556.
 Fargo, N. D.:
—Northern States Power Co.:
Resistors installed inside cars, 194.
Preventing freezing of air pipes, 269.
 Ferry:
—Gasoline-driven, Operated by San Francisco-Sacramento Ry., *204.
 Financial (see also Statistics, Reports, Financial):
—Analysis of public utility financing, 389.
—Brooklyn City R. R. bond issue, 122; Comments on, 85.
—Buffalo & Erie Ry., Equipment trust issue, 44.
—Buffalo, N. Y., Service curtailed account deficits, 912.
—Calculating profit and loss, Comments on, 570.
—Census report of electric railways, 305; Comments on, 284.
—Chicago & Joliet Electric Ry. sold to Insull interests, 80.
—Chicago plans purchase of all transportation facilities, *369; Comments on, 361.
—Company organized to supply railway buses, 717.
—Continued improvement expected, Comments on, 534.
—Co-ordination plan, Newport Electric Corp., 161.
—Customer-ownership plan suggested in Toledo, 923.
—Detroit United Railway receivership, Comments on, 485.
—Developing new business on interurbans, Comments on, 494.
—Development of Insull properties expected, 426.
—Electrical operation, C. M. & St. P., Effects big saving, *338.
—Eureka, Cal. railway needs money for reconstruction, 394.
—Expenditures, 1923 railway industry estimate, 4.
—Extra appropriation approved in Cincinnati, 199.
—Financial position, Pittsburgh Rys., *799; Comments on, 797.
—Financing of bus purchases arranged, Cleveland, 557.
—Foreclosures (see also Reorganization under Financial):
Beech Grove Traction Co., 951.
Chicago, Lake Shore & South Bend Ry., Sale ordered, 871.
Columbus, Newark & Zanesville Electric Ry., 319.
Frankford, Tacony & Holmesburg Street Ry., 1924, 1033.
Long Island Electric Ry., 1033.
Kansas City, Kaw Valley & Western Ry., 1031.
Kansas City Rys., 790; Decree signed, 869.
Review of 1923, Statistics, 31.
—Gainesville, Ga., railway sold to be junked, 638.
—General Electric Co. sales, 1924, 567.
—Grand Rapids, Mich., Railway sold to operating officials, 86.
—Interurban consolidation in Middle West [Boeler], 935; Comments on, 915; [Storrs], 1031.
—[Cates], [Henry], [Brady], c930.
—Interurban consolidation would bring prosperity [Storrs], 933.
—Louisiana utilities 1924 improvement expenditures, 244.
—Montreal Tramways refinancing plan, 387.
—Method proposed for Pittsburgh, Pa., subway, *409; Comments on, 396.
—New holding company for Southwest utilities, 487.
—New truck corporation organized, 753.
—New York electric railways improving, 121.
—North Shore Line completes extension, Details, *589.
—President Shannahan's annual progress statement, 154.
—Progress in Denver since receivership, 638.
—Property ownership spreading [Hoover], 418.
—Publicly owned transportation areas, Massachusetts, *59.
—Public utilities natural monopolies, Comments on, 683.
—Public utility securities as investments, 909; Comments on, 876.
—Railway conditions improved in 1924, Comments on, 1.
—Railway costs approaching stabilization [Richey], 15; Comments on, 3.
—Railway outlook, 1924 reviewed, 26; Comments on, 1.
—Rapid transit construction, Method of financing [Smith], 495.
—Rapid transit extensions, Financing, Hamburg [Stein], 655.
—Receiverships:
Boston & Worcester Street Ry., 319.
Chicago, Lake Shore & South Bend Ry., 489.
Detroit United Ry., 431.
Frankford, Tacony & Holmesburg Street Ry., Philadelphia, 279.
Indianapolis & Cincinnati Traction Co., 750.

Financial (Cont.):

- Long Island Electric Railway, 279.
- Oklahoma Railway, 79.
- Review of 1924, 31.
- Union Traction Co. of Indiana, 79.
- Refunding plan, Worcester, Mass., 104.
- Reorganizations:
- Binghamton, N. Y., Plans, 791.
- Chicago, Lake Shore & South Bend Ry. plan, 238.
- Columbus Railway, Power & Light Co. plans, 42.
- Denver & Northwestern Ry., 709.
- Denver Tramways, 277, 709, 838, 872, 932, 900.
- Detroit United Ry., Plans under way, 748, 900; Comments on, 1001.
- Hartford & Springfield Street Ry. plans, 43.
- Interstate Consolidated Street Ry., Attleboro, Mass., 277.
- Kansas City Rys., 673, 790, 809, 907.
- Merger of Trenton-Philadelphia lines reported, 832.
- New York Railways, 123, 202, 677, 748, 907.
- Northern Ohio Electric Corporation, 239.
- Northern Ohio Traction & Light Co. Plans, 43.
- United Railways of St. Louis, 318, 907; Plans outlined [Buck and Stocks], *397; Comments on, 395.
- Republic Truck Co. receivership lifted, 491.
- Results of two-years all-bus operation, Newburgh, N. Y., *813.
- St. Louis-Kansas City Short Line R. R. organized, 480.
- Scranton and Altoona railways sold to Pitkin interests, 428.
- Seattle Municipal Ry., Deficits explained, 905.
- Securities issued in 1924 in California, 79.
- Sun Life Insurance Co. investment in Illinois Traction explained, 939.
- Transit program, New York City, Large expenditures planned, 517.
- Twin City valuation fixed, 430.
- United Light & Power Co. expands, 277.
- United Railways of St. Louis, Mo., History of [Buck and Stocks], *397; Comments on, 395.
- Utility financing increasing, 634.
- Virginia railway property sold, 950.
- Fire Protection:
- Fire alarm and watchman signal system, 906.
- Fire extinguishers, Housing, N. Y. C., *656.
- Fire fighting apparatus in Everett shops, Boston "L", Details, *499.
- Fires (see Storm and fire damage).
- Foreclosures (see Financial).
- Foreign practice (see European practice).
- Fort Dodge Des Moines & Southern R.R. (See Boone, Iowa).
- Fort Madison, Iowa:
- Fort Madison Street Ry.: Fares increased, 708.
- Fort Wayne, Ind.:
- Indiana Service Corp.: Board of directors, New interests elected, 428.
- Improvements planned in 1925, 401.
- System sold to Mr. Inaull, 354.
- Fort Worth, Tex.:
- Northern Texas Traction Co.: Bar stock stored in outdoor rack [Porter], *943.
- Interurban express service, *1015.
- Transit situation, [Gordon], *1009; Comments on, 1003.
- Wheel service, statistics, 759.
- Framingham, Mass.:
- Boston & Worcester Street Ry.: Bus operation allowed, 865.
- Bus permit refused in Worcester, 162.
- Foreclosure proceedings requested, 201.
- Freight delivery planned, 649.
- Freight traffic development, *846.
- Receiver appointed, 319.
- Track suit won, 30.
- France:
- Alsace, Interurban electrification plans for, 634.
- Compagnie Générale Française de Tramways. Annual report, 867.
- Electric auto bus development, 994.
- Lyons, electric buses for, 270.
- Midl Railway: Electrification progress, 994.
- Paris: Electrification of suburban railways, *370.
- Gne-man express bus successful, 559.
- Subway system to be extended, 747.
- Franchises:
- Ambridge, Pa., Agreement reached, 826.
- Cincinnati agreement, 519, 945, 1027.
- Freeport, Ill., Agreement reached, 864.
- Milwaukee Service-at-cost franchise defeated, 425, *591.
- Pittsburgh, Pa., Service-at-cost franchise. Results, [Fitzgerald], 986.
- Quebec, Agreement reached, 780.
- Rockford, Ill., controversy, 785; Won by vote, 1020.
- Rockford, Ill., New Company to operate railway, 108.
- Spartanburg, S. C., Franchise voted, comments on, 875.
- Freeport, Ill.:
- Illinois Northern Utilities Co.: Franchise compromise, 804.
- Freight and Express:
- Developing long-haul service [Storrs], 933.
- Freight delivery service discussed by C.E.R.A., 100.
- Freight service started, Pittsburgh, Pa., to Cleveland, Ohio, 1030.
- Freight traffic discussed by New York Elec. Ry. Assn., 146.
- Future operation by railways [Ruffe], 802.

Freight and Express (Cont.):

- Interurban consolidation increase possibilities [Beeler], 935; Comments on, 915; [Storrs], [Coates], [Henry], [Brady], c930.
- Interurban freight traffic, Source and development [Brown], 147.
- Motorcycles with sidecars for freight pick-up, Toronto, 264.
- Pennsylvania-Ohio Electric Co., Methods [Graham], *223.
- Prompt freight delivery, Cleveland to Toledo, 1025.
- Refrigerator car for service, Akron, Ohio, Details, *221.
- Traffic development, Freight, *846.
- Fuels:
- Coal agreement stimulates non-union mining, 359.
- Gasoline prices up, *371; Comments on, 362.
- Pulverized coal tests, Providence, R. I., [Slade], *511.
- Gainesville, Ga.:
- Gainesville Ry.: Road sold and to be junked, 638.
- Galveston, Texas:
- Galveston-Houston Electric Ry.: Trolley arrangement on lift bridges, Details, [Greer], *139.
- Garages:
- Boston "L", Forest Hills, Details, 393.
- Detroit United Ry., *685.
- Gary, Ind.:
- Gary Street Ry.: Axle bearings held by dowels for drilling, *105.
- Cars ordered, Specifications, 606.
- Headlights, adjustable mounting, *71.
- Pedestal law castings, Machining, *342.
- Gears and pinions:
- Lubricating motor gears, Germany, *613.
- General Electric Co.:
- Utility holdings relinquished, 42.
- Georgia Railway & Power Co. (see Atlanta, Ga.)
- Germany:
- Berlin: Suburban electrification put in operation, *503.
- Berlin Elevated & Underground Ry. New door arrangement, *310.
- Semi-steel cars used, Designs, *680.
- Developments Foreign Practice Committee, A.E.R.A. might have seen [Stein], 341.
- Electrification plans, 521.
- Hamburg Elevated Ry.: Financing extensions [Stein], 655.
- Railways try articulated trains, *259.
- Glasgow (See Great Britain).
- Glens Falls, N. Y.:
- Hudson Valley Ry.: Annual report, 596.
- Government, Waste in, 820; Comments on, 875.
- Grafton, W. Va.:
- Tygart's Valley Traction Co.: Annual report shows gain, 388.
- Grand Rapids, Mich.:
- Grand Rapids, Grand Haven & Muskegon Ry.: Operating officials purchase roads, 868.
- Grand Rapids Ry.: Arbitration board ends controversy, 946.
- Design of sample cars discussed, [Gordon], 930; [Kippenberger], 937.
- Kuhlman sample car, Details, *767.
- Light-Weight Noiseless sample car, Design, *520, *721; Comments on, 719.
- St. Louis sample car, Design, *807, 880, [Gass], 938.
- Grass Valley, Cal.:
- Nevada County Traction Co.: Lines abandoned, 204.
- Great Britain:
- British tramway wage controversy settled, 120.
- City & South London Ry., London: Reconstruction completed, Details, *141.
- Fare reductions, 354, 867.
- Glasgow Corporation Tramways: Bus competition problem, 867.
- New route number system, 276.
- Transportation to be improved, 120.
- Lanarkshire Tramways: Bus service extended, 934.
- London Underground Rys.: Annual report, 485.
- Automatic ticket machines, 807.
- Dividends declared, 521.
- Fares decreased, 747.
- Improvements in underground service, 120.
- London United Tramways: One-man cars installed, New design, Details, *58.
- Metropolitan District Ry., London: Electrification, 550.
- Revenue increases, 505.
- Signal system changed, 735.
- Metropolitan Elec. Tramways: Automatic route guide, 634.
- Municipalities seek bus privileges, 747.
- Tramway statistics, 276.
- West Ham, England: Railway celebrates birthday, *595.
- Great Northern R.R.:
- Locomotives ordered, 705.
- Greenfield, Mass.:
- Connecticut Valley Street Ry.: Property liquidated, *59.
- Greenfield & Montague Transportation Area: Purchase and operation of portion of Connecticut Valley St. Ry., *59.
- Northern Massachusetts Street Ry.: Property liquidated, *59.

H

- Hamilton, Ont.:
- Hamilton Street Ry.: Competition may force abandonment, 871.
- Harriaburg, Pa.:
- Harriaburg Railways Co.: Pull-ins reduced, *91.
- Hawaii:
- Honolulu Rapid Transit Co.: Annual report, 870.
- Fares increased, 119.
- Hazleton, Pa.:
- Lehigh Traction Co.: Record traffic on Decoration Day, 004.
- Headways (See schedules):
- Heaters, Electric:
- Hot air blast heater, (Consolidated), *108.
- Illinois Central cars for electrification service, *211.
- Safety switch for, *157.
- Sandpipe heater, *345.
- Unit bus heater [Petry], 231.
- Wire for, Improved nichelchrome, 196.
- Heavy Electric Traction (See also Locomotives, Electric):
- Austrian electrification progress, 867.
- Berlin suburban electrification, *503.
- Canadian electrification progressing, 681.
- Cars for Illinois Central electrification, *211.
- C. M. & St. P., Comparison with steam operation, 338.
- Dallas-Denton steam line electrified, Details [Cooke], *647; Comments on, 646.
- German electrifications plans, 521.
- Great Northern Railway to electrify line, 795.
- Jamaica-Babylon electrification completed, *803; Comments on, 797.
- Long Island R. R. electrification plans, 557, 990.
- Midl Ry., France, Electrification progress, 994.
- Morocco, Electrification progress, 994.
- Paris, electrification of suburban railways, *376.
- Progress during 1924 reviewed, 14.
- Review of work on roads out of New York City, 311.
- Russian electrification progressing, 867.
- Standardization urged at A.I.E.E. meeting, 810.
- Steam railroad electrification discussed by N.E.L.A., 1017.
- Swiss Federal Rys., Electrification progress, Details, *727.
- Virginia Ry., Economies expected from electrification, *843.
- Yonkers, N. Y., Electrification to proceed, 744.
- Highwood, Ill.:
- Chicago, North Shore & Milwaukee R.R.: Annual report, 673.
- Automatic barriers protect highway crossing, *543.
- Methods of making friends of patrons, 379.
- Substation performance, 931.
- Holyoke, Mass.:
- Holyoke Street Ry.: Power contract, Details [Pollister], *541.
- Hornell, N. Y.:
- Hornell Traction Co.: Mile line abandoned, 390.
- Hot Springs, Ark.:
- Teles track construction, Details [Gauthier], *615.
- Housings:
- Maintenance of housing fits, Details [Whitney], *451.
- Houston, Tex.:
- Houston Electric Co.: Automatic signals, single track lines, *850.
- Bus and railway operation, Details [Gordon], *1009.
- Pit hoist, Suspended, for handling motors, *771.
- Hudson & Manhattan R.R. (see New York City).
- Hudson, N. Y.:
- Eastern New York Utilities Corporation: Abandonment of local tracks applied for, 594.
- I
- Illinois Central R.R.:
- Cars for Chicago electrification, Design, Details, *211.
- Increase in commutation rates sought, 161.
- Power contract for electrified lines, 63.
- Illinois Electric Railway Association: Annual meeting, 266, 507.
- Illinois Power & Light Co. (see Chicago, Ill.).
- Illinois, State of: Indeterminate franchise bill before legislature, 744, 906.
- Illinois Traction System (see Chicago, Ill.).
- India:
- First electrified line opened, 634.
- Indianapolis, Ind.:
- Indianapolis & Cincinnati Traction Co.: Advertising campaign, *60.
- Fare reduction, 486.
- New equipment increases re-handling value, 138.
- Receiver appointed, 750.
- Indianapolis Street Ry.: Annual report, 1031.
- Bus extension planned, 788.
- Interstate Public Service Co.: Interstate through bus service established, 865.
- Parlor-car bus service installed, 905.

Abbreviations: *Illustrated, c Communications.

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX

- Indianapolis, Ind. (Cont.):
 —Terre Haute, Indianapolis & Eastern Traction Co.:
 Appointment of receiver sought, 639.
 Inspection of track and roadway basis of prize award, *461.
- Indiana Public Utility Association:
 —Annual convention, 193.
 Indiana Service Corp. (see Fort Wayne, Ind.).
- Indiana, State of:
 —Bus bill, Passage awaited, 351.
 —Bus regulation in, 479.
 —Charging fees on no par value stock, 749.
 —Tax appraisals of railways cut, 952.
 —Utility regulation bills before legislature, 199.
 Inspection of cars (see also Maintenance Practice):
 —Controller drums, fixture for, *624.
 —Fare boxes, St. Louis practice, *99.
 —Philadelphia, On wait-hour basis, *95.
 —Special trackwork, [Gennett], 378.
 —Track and roadway, basis of prize award, *461.
- Insulation:
 —High-voltage insulators, Relation to radio, 147.
- Insurance and pensions:
 —A. E. R. A. committee report, 301.
 —Co-operative group insurance for employees, Baltimore, 883.
 —Discussed by U. S. Chamber of Commerce, 856.
 —Employee, Denver, *657.
 —Lean Association enables employees to buy homes, St. Louis, 39.
- Insurance, Fire:
 —Safety reduces costs of [Scott], 508.
- Interborough Rapid Transit Co. (see New York City).
- International Electrical Congress:
 —Traction motors discussed at Hague meeting, 738.
- International Railway Co. (see Buffalo, N. Y.).
- Interstate Commerce Commission:
 —Work of, Discussed [Shannahan], 547.
- Interstate Consolidated Street Ry. (see Attleboro, Mass.).
- Interstate Public Service Co. (see Indianapolis, Ind.).
- Interurban Railways:
 —Consolidation in Middle West, [Beeler], 935.
 —Comments on, 915; [Storrs], [Coates], [Henry], [Brady], *930.
 —Developing new business, Comments on, 494.
 —Discussed by New York Electric Ry. Assn., 146.
 —Dispatching methods for single-track operation [Rollins], *730.
 —Freight traffic, Source and development, [Brown], 147.
 —Interurban passengers transfer to buses at outlying terminals, *685.
- Italy:
 —Street car lines show little profit, 867.
 —New electric railway approved, 634.
- J**
- Jackson, Mich.:
 —Michigan Electric Ry.:
 Baggage cars, Control equipment for [Seibold], *580.
 Interest defaulted, 43.
- Jamaica:
 —Jamaica Public Service Co., Kingston:
 Annual report, 677.
- James H. McGraw Awards:
 —Annual awards established for electrical men, 862.
- Jacksonville, Fla.:
 —Jacksonville Traction Co.:
 Anniversary celebrated, South Jacksonville line, 947.
- Java:
 —Java State Rys.:
 Manufacturers of ten countries contribute to electrification, 125.
- Jigs:
 —Expedite multiple drilling, Columbus, Ohio, *335.
 —For cutting circular disks with torch, *382.
 —For grinding triple valves, *515.
 —Jigs used for rebuilding controllers, Syracuse, N. Y., *609.
 —Jigs used in reboring motors [Whitney], *761.
 —Storage of, Columbus, Ohio, 479.
- Jitneys (see Motor buses):
 Joliet, Ill.:
 —Chicago & Joliet Electric Ry.:
 Purchased by Insull interests, 80.
- K**
- Kansas City, Mo.:
 —Bus development, Effect on interurbans, 37.
 —Central interurban station unlikely, 1028.
 —Comment on arbitration decision of court, 669.
- Kansas City, Clay County & St. Joseph Ry.:
 Annual report, 636.
 Co-ordination of railway and bus service, 74.
- Kansas City Rys.:
 Bead of solder on armatures indicate clearance [Lynch], 231.
 Bearing faces finished in small planer, [Reiff], *106.
 Bulldozer, Pneumatic, for forge shop, *71.
 Bus bids received, 795.
 Buses ordered, Details, 999.
 Bus plan progress, 39, 593, 667, 706, 795.
 Foreclosure to be made, 799.
 Inspection reduces pull-ins, *329.
 Motor maintenance, [Neal], 457.
 Reorganization terms, 673, 860, 907.
 Sand dryer and asphalt plant, Details, *414.
 Storage battery trucks used in shops, *453.
- Kansas City, Mo. (Cont.):
 —St. Louis-Kansas City Short Line R.R. (see St. Louis, Mo.).
- Kansas, State of:
 —State regulates buses, Details, 1025.
- Key System Transit Co. (see Oakland, Cal.).
- Kingston, N. Y.:
 —Kingston Consolidated R. R.:
 Partial abandonment sought, 674.
- Kingston, Ont., Can.:
 —Kingston, Portsmouth and Catarqui Electric Ry.:
 Fares decreased, 830.
- Knoxville, Tenn.:
 —Knoxville Power & Light Co.:
 Car order, Specifications, 508.
 One-man car law, Suit brought, 906.
- Kokomo, Ind.:
 —Northern Indiana Power Co.:
 Motors removed without lifting car bodies, *380.
- L**
- Labor (see Employees):
 Lake Shore Electric Ry. (see Cleveland, O.).
- Lamps (see Lighting and lighting fixtures).
- Legal:
 —Amendment to Ohio bus law is sought, 115.
 —Anti-jitney law constitutional, Atlanta, Ga., 519.
 —Charging fees on no par value common stock, 749.
 —Citizen employees can be discharged, Boston "L," 161.
 —Interstate bus cases, Decision, 384.
 —Legal notes, 45, 241, 301, 564, 715, 910.
 —New income tax ruling, 121.
 —One-man car law held to be legal, Tennessee, 1025.
 —Public control extension, Boston "L," Reports, 158; Comments on, 128.
 —Supreme court decision, N. Y. C. rate case, 862, 889.
 —Supreme Court, Tennessee, holds electric power combinations legal, 238.
 —Taxis enjoined from competing with railways, W. Va., 861.
 —Transportation acts reviewed [Each], 290.
 —Uniform traffic laws proposed [O'Connor], 113.
 —Utility measures before California legislature, 169.
 —Utility regulation bills before Indiana legislature, 199.
- Legislation for Railways:
 —Change in New York law approved, 670.
 —Freight and passengers may be carried by motor vehicles, 558.
 —Intermediate permit law passed, Oklahoma, 670.
 —Mail pay case, Decision, 1023.
 —Massachusetts, Transportation area statutes of 1920, Details, *59.
 —Railway operation of buses allowed, New Jersey, 745.
 —Service-at-cost measure approved in Missouri, 668, 746.
- Lighting and lighting fixtures:
 —Gary, Ind., Headlights, adjustable mounting, *71.
 —Third Avenue Ry. one-man car, *877.
- Lincoln, Ill.:
 —Bus-street car question to be voted on, 1024.
- Lincoln, Neb.:
 —Lincoln Traction Co.:
 Truss, rail for repairing rail joints, *344.
- Little Rock, Ark.:
 —One-man cars approved, 273.
- Loading platforms (see also Terminals and waiting stations):
 —Baltimore, Marked with warning lights, *536.
 —Installed in Philadelphia, 314.
- Locomotives, Electric:
 —Articulated, Illinois Traction, Details, *187.
 —Diesel engines, Use of suggested, New York Central R.R., 863.
 —Double-truck articulated, Montreal, *83.
 —For New York Central R.R., Details, *102.
 —Freight hauled by, Aroostook Valley R.R., Design, *1007.
 —Freight locomotives built at St. Catharines, Ont., Details, *853.
 —Great Northern R.R. order, 795.
 —Motor design discussed by A. I. E. E., 266.
 —Ordered during 1924, Statistics, 25.
 —Paris State Railways, Design, *376.
 —Three-phase, used on Swiss Federal Rys., 407, *727.
 —Virginian Ry., Coal train hauling, Details, *843.
 —Virginian Ry. demonstration, 795.
- Long Island Electric Ry. (see New York City).
- Long Island R.R. (see New York City).
- London, Ont., Can.:
 —London Street Ry.:
 Annual report, 277.
- Los Angeles, Cal.:
 —Los Angeles Motor Bus Co.:
 Tire maintenance practice, *449.
- Los Angeles Rys.:
 Combined service report used, *659.
 Seats rearranged on cars, *545.
 Sign maintenance, 772.
- Pacific Electric Ry.:
 Fare increase sought in Pasadena, 743.
 Signal system, Fire alarm and watchman, 966.
 Sub-surface terminal, Details, *170.
 Weeds killed with poison, Equipment for, *884.
 —Rapid transit plan proposed, 705.
 —Taxi "no cruising" ordinance recommended, 806.
 —Traffic survey report, 198, *731.
- Louisville, Ky.:
 —Louisville & Interurban Ry.:
 Head-on collision, 1027.
- Louisville Ry.:
 Annual report, 637.
 Municipal difficulties, Effect on railway, 991.
- Lubrication:
 —Causes for failure in service, 473.
 —Motor gears, German practice, *613.
 —Practice on Interborough, *440.
 —Pump, Bucket, Removes and applies grease, *978.
 —Underground storage for oils, *620.
- M**
- Madison, Wis.:
 —Madison Ry.:
 Bus line installed as auxiliary, 351.
 Cars ordered, Specifications, 436.
 Fare increase, 76.
- Mail pay, Court decision, 1023.
- Maintenance practice (see also Repair shop practice and car cleaning):
 —Accurate cost of, Records valuable, Comments on, 323.
 —Armature bearing and housing fits, Details [Whitney], *451.
 —Car springs, Twin Cities, *325.
 —Emergency equipment in street boxes, 332.
 —Good maintenance is cheap maintenance, Comments on, 439.
- Illinois Electric Railway Ass'n., Discussion, 507.
- Inspection methods, Philadelphia, *95.
- Major problem facing industry, Comments on, 437.
- Methods employed, Chicago Surface Lines [Shaughnessy], 509.
- Methods used on Interborough, Details, *440.
- Metropolitan Section, A. E. R. A. discusses, 418.
- Pull-ins:
 Cause of, 71.
 Dallas, Reduced, 473.
 Detroit, Competition decreases, *770.
 Harrisburg, Pa., Reduced, *91.
 Kansas City, Inspection reduces, *329.
 Southern Properties, Record, *230, 347, 471, 822; Comments on, 323.
 —Reducing noise by maintenance [Williams], *765, Comments on, 324.
 —Sign printing in Detroit [Williams], *261.
 —Uniformity of design desirable, Comments on, 808.
- Welding table for light work, *230.
- Malay Peninsula:
 —Singapore Electric Tramways:
 Trackless trolley expansion, *694.
- Management:
 —A. E. R. A. committee report, 301.
 —Business paper of the future, Its needs and helpfulness [McGraw], 228.
- Mansfield, Ohio:
 —Ohio Public Service Co.:
 Weekly pass adopted, 830.
- Market conditions:
 —Belgian company to manufacture engine, 681.
 —Bituminous production large, 169.
 —Brown, Bovari & Co., Switzerland, to enter American market, 207.
 —Bus manufacturer reviews year's operations, 835.
 —Cables, Impregnated paper, To be manufactured in America, 795.
 —Cement production increased, 244.
 —Coal situation discussed, 642.
 —Copper production in 1924, 83.
 —Electric locomotive shipments, Quarterly report, 359.
 —Export trade increased in 1924, 874.
 —Fargo Motors Co., 1924 sales, 48.
 —Foreign trade policy defined, 796.
 —Gasoline prices advanced, Reasons for, 359.
 —General electric sales in 1924, 567.
- Java electrification, 10 countries receive orders, 125.
- Louisiana utilities improvement expenditures, 1924, 244.
 —Lumber supply assured, 753.
 —Mica, Demand increases, 605.
 —Paving brick, Types reduced, 874.
 —Place of technical paper in business world, [Hoover], 236.
 —Production efficiency increasing, 1036.
 —Railway orders with Differential Steel Car Co., 244.
 —Rubber prices advance, 913.
 —Steel trade, Trend of, 281.
 —Trade statistics legal, U. S. Supreme Court decides, 913, 955.
- Market Street Ry. (see San Francisco, Cal.).
- Massachusetts, State of:
 —Bus regulation discussed before Legislature, 271, 313.
 —Two transportation areas formed under statute of 1920, *59.
 —Want buses placed under city control, 198.
- McGraw Award:
 —Annual award established for electrical men, 865.
- McGraw-Hill Co.:
 —Annual Convention, 236; Comments on, 210.
 —Business paper of future [McGraw], 228.
 —Place of technical paper in business world [Hoover], 236.
- Medical:
 —Treatment of burns [Wymer], 581.
- Memphis, Tenn.:
 —Memphis Street Ry.:
 Annual report, 995.
 Employees accept existing wage, 631.

- Merchandising Transportation (see also Publicity & Traffic Stimulation):
 —A.E.R.A. committee report, 300.
 —Car window cards used in Chattanooga, *263.
 —Dollar Day fare reduction increases revenue, 416.
 —Electrified map attracted shippers at Indiana convention, *920.
 —Ft. Worth practice, Comments on, 1001.
 —Intensive merchandising campaign, Coffeyville, Kans., 483.
 —Modern car designs, Effect on traffic, [Gordon], 937; [Kippenberger], 937.
 —New equipment as a means of, 138.
 —Selling rides [Jackson], 980.
 Miami, Fla.:
 —Miami Beach Ry.:
 —Opening of Coral Gables line celebrated, *787.
 Michigan City, Ind.:
 —Chicago, Lake Shore & South Bend Ry.:
 —Foreclosure ordered, 871.
 —Receiver appointed, 489.
 —Reorganization, Tentative plan, 238.
 Michigan Electric Rys. (see Jackson, Mich.)
 Michigan, State of:
 —Amendment to bus bill suggested, 676.
 —Gasoline and weight tax bills passed, 274.
 Middlesex & Boston Street Ry. (see Newtonville, Mass.)
 Midwest Electric Railway Association:
 —Annual meeting, Report, 890.
 —Purpose of, Comments on, 171.
 Mid-West Motor Transport Conference:
 —Transportation problem discussed, 807.
 Milford, Mass.:
 —Milford & Uxbridge Street Ry.:
 —Dipping and baking armatures, *702.
 —Light-weight cars effect saving, *726.
 Milwaukee, Wis.:
 —Milwaukee Electric Railway & Light Co.:
 —Accident reduction contest, *690.
 —Experience with buses [Way], 291.
 —Extension granted for freight hauling, 314.
 —Machine for finishing concrete pavement, *61.
 —Railway operating revenues, 674.
 —Removable top for upper deck of buses [Lucas], *192.
 —Testing drawbars on cars, *344.
 —Service-at-cost and purchase contract, 551, *591; Discussed by W. H. Maltbie, 234, 425; Comments on, 608.
 —Window guard for spray painting [Lucas], *612.
 —Wisconsin Railway, Light & Power Co.:
 —Fare increase asked, 314.
 Minneapolis, Minn.:
 —Minneapolis Street Ry.:
 —Court action delays settlement, 636.
 —Valuation proceedings, 430, 522, 910, 950.
 —St. Paul City Ry.:
 —Court action delays settlement, 636.
 —Higher fare avoided, 830.
 —Rate case reviewed, 831.
 —Valuation controversy, 430, 522, 740, 910.
 —Twin City Rapid Transit Co.:
 —Babbitt department, Proper equipment improves results, *93.
 —Bus expansion planned, 865.
 —Car building activities, 281.
 —Car aprings, Maintenance practice, *325.
 —Financial report for 1924, 387.
 —Tank for heating and cleaning pinions, 71.
 Missouri-Kansas-Texas R.R.:
 —Dallas-Denton line electrified, Details, [Cooke], *647; Comments on, 646.
 Missouri, State of:
 —Bus bill in Legislature, 517, 740.
 —Service-at-cost measure approved, 483, 668, 740.
 Monongahela-West Penn Public Service Co. (See Fairmont, W. Va.)
 Montreal, Que., Can.:
 —Harbor Commissioners of Montreal:
 —Locomotives, Double-truck articulated, *83.
 —Montreal Tramways & Power Co.:
 —Bond issue offered, 487.
 —Bus service, Supplementary begun, 905.
 —Expansion planned, 162.
 —Financial structure being simplified, 636.
 —Refinancing, Proposed plan for, 387.
 —Track improvement plans, 272.
 —Safety meeting, Report, 1020.
 Morocco:
 —Electrification progress, 994.
 Motor buses, Design:
 —Boston show, Types exhibited, 491.
 —Detroit municipal buses, Double-deck, Details, *753.
 —Detroit United Ry., Terminal service buses, *685.
 —Fageol gas-electric trial bus, 643.
 —Gas-electric, Advantages of [Thirwall], 150.
 —Milwaukee, Removable top for upper deck, [Lucas], *102.
 —Newark, N. J., for inspection trips, *54.
 —Oak Park, Ill., McGuire-Cummings, *435.
 —Philadelphia, Gas-electric, [Queeney], 151; 604.
 —Rensselaer, N. Y., Pay-enter type, *65.
 —Standardization and excessive sizes should be avoided [Dahl], 294.
 —Studebaker to build buses, 605; Chassis design, *977.
 Motor buses, Field for:
 —All the year vehicle, Comments on, 302.
 —Bus competition, Significance of [Chase], 899.
 —Buses convey interurban passengers into city, Detroit, *685.
 —Cannot take the place of rapid transit subways, 372.
 —City service, Type and methods [Holden], 818.
 —Co-ordination with interurban railway in Missouri, 74.
 Motor buses, Field for (Cont.):
 —Co-ordination with railway, Newport, R. I., plan, 161.
 —De luxe and special service [Tripp], *296.
 —Development on interurban lines, Kansas City, 37.
 —Discussed by Illinois Electric Railway Assn., 507.
 —Feeders to the railway lines [Dahl], 294; Comments on, 720.
 —Future of the bus [Bulle], 802.
 —Link industrial and residential sections, Rensselaer, *65.
 —Operating offer made by I.R.T., New York City, 109.
 —Pittsburgh Railways seek charter, 160.
 —Railway officials use for inspection trips, Newark, N. J., *54.
 —Rochester, N. Y., Independent owners ask permission to install lines, 351.
 —Service, Kind and extent, Survey of 150 companies, 5; Comments on, 2.
 —Subsidiary to railway [Bulle], 818.
 Motor Buses, Gasoline-electric:
 —Discussed by New England Street Railway Club, 205.
 —Experience with, 29 years [Thirwall], 150.
 —Final road tests, Philadelphia Rural Transit Co., 604.
 —Philadelphia's reasons for [Queeney], 151.
 Motor buses, Installation:
 —Ann Arbor, Mich., 424.
 —Baltimore, Md., 488.
 —Boone, Ia., 520.
 —Boston & Worcester Street Ry., Permits granted, 865.
 —Bridgeport, Conn., 788.
 —Chicago, Milwaukee & St. Paul R.R., 993.
 —Cleveland Railway, 594.
 —Denver, Colo., 519.
 —Detroit, Mich., Eighth route, 313.
 —Duluth Street Ry. purchases bus lines, 632.
 —Georgia Railway & Power Co., 311, 384, 482.
 —Indianapolis, Parlor car bus service, 905.
 —Kansas City Rys., Franchise granted, 593.
 —Madison Railways adopt as auxiliary, 351.
 —Montreal, Que., Supplementary, 905.
 —New York, New Haven & Hartford R.R., 992; Comments on, 1002.
 —Olean, Bradford & Salamanca Ry. granted franchise, 707.
 —Orders by railways during 1924, Statistics, 7, 61; Comments on, 2.
 —Railways seek bus permits, Comments on, 646.
 —Rochester, N. Y., Suburban plans, 312.
 —Topeka, Kans., Supplementary to railway, 315.
 —Union Traction Co. of Ind. seeks permits, 865.
 —Washington Ry. & Electric Co. [Miller], *247.
 —Worcester, Mass., Railway plans, 743.
 —Yonkers, N. Y., 993.
 Motor buses, Jitney competition:
 —Atlanta, Ga., Regulation, *181, 197, 234; Comments on, 209.
 —Terre Haute, Ind., Ordinance restricting, 480.
 Motor buses, Practice with:
 —Apron prevents riding on bumpers, *304.
 —Better marking of routes needed, Comments on, 532.
 —Bus maintenance important railway problem, Comments on, 438.
 —Discussed at A.E.R.A. Midyear meeting 288.
 —Newark, N. J., Route numbers for bus lines, *413.
 —Operating results, San Antonio & Houston, 776.
 —Operation analyzed, 560, 736.
 —Pit tool boxes reduce time of repairs, *469.
 —Principles found successful, Milwaukee [Way], 291.
 —Railway operation of bus discussed at Mid-West Motor Transport Conference, 897.
 —Railways demand city control of buses, 109.
 —Sand boxes installed, Detroit, *645.
 —St. Louis, Mo., Competition with railway [Buck and Stocks], *397; Comments on, 393.
 —Texas cities, Railway use and practice [Gordon], *1000.
 —Tire maintenance practice, Los Angeles, *449.
 —Traffic increase, Beaver Valley bus lines, *851.
 —Two years of all-bus operation, Newburgh, N. Y., *813.
 —Urban transit must be centralized, Detroit, 825.
 Motor buses, Regulation:
 —Bills introduced in New York legislature, 312.
 —Centralization of government urged [Hoover], 820.
 —Commission regulation, Indiana, 479.
 —Discussed at Mid-West Association convention, 890.
 —Discussed at Mid-West Motor Transport Conference, 897.
 —Discussed at U. S. Chamber of Commerce meeting, 819.
 —I.C.C. jurisdiction, 384; [Storrs], 933; Comments on, 395.
 —Kansas regulations, Details, 1025.
 —Legislation introduced in Congress, 427.
 —Massachusetts, Discussed before Legislature, 271.
 —Minnesota commission to hear bus application, 631.
 —National Motorbus Association organized, 1019.
 —Ohio cities to rule buses, 385.
 —Oregon bus operators urge regulation, 76.
 —St. Louis, Mo., Regulatory ordinance proposed, 36.
 —Wisconsin, No restrictions in state laws, [Way], 291.
 Motors, Electric:
 —Controllers for shop motors, 348.
 —Designs on Baltimore cars, *577.
 —Discussed by International Electrical Congress, Hague, 738.
 —Field coils, Precautions in replacing, 344.
 —"General purpose," New type (G-E), 775.
 —Improved design reduces maintenance cost, 890.
 —Inspection of, Kansas City, *329.
 —Locomotive design discussed by A.I.E.E., 266.
 —Maintenance practice:
 —Decatur, Ill., 771.
 —Interborough Rapid Transit Co., *440.
 —Kansas City, Mo., [Neal], 457.
 —Motor frames dipped and baked, *342.
 —Motor gear case arms, *740.
 —Reboring frames for oversize housings [Whitney], *761.
 —Re-conditioning to increase bearing mileage, *473.
 —Resistors mounted on side of cars, Syracuse, *231.
 —Rubber bushing protects leads, *624.
 —Spraying varnish inside frames, *515.
 —Starter for monorail hoist service, (G. E.), *382.
 —Starting switch for shop motors, 962.
 —Suspended pit hoist for handling, *771.
 —Syracuse, N. Y., Failures reduced [Worlock], *757.
 —Ventilation prolongs life of, 347; Comments on, 323.
 —Philadelphia & Western Ry. Interurban car, Details, *133.
 —Suspension, Improved type, Des Moines, Ia., *516.
 Municipal Operation: (See also Government ownership)
 —Boston Elevated, Reports filed, 158; Comments on, 128.
 —Chicago, Ordinance proposed, 35, 75, 115, 138, 234, 271, 350, *369, 383, 426, *591; Comments on, 172, 361, 608.
 —Comments on, 86.
 —Detroit management, Comments on, 756, 915.
 —Journal's attitude commended [Schram], *889.
 —Milwaukee, Wis., Ordinance proposed, 551, *591; Discussion [Maltbie], 234, 425; Comments on, 608.
 —Phoenix, Ariz., Complications, 1023.
 —Rockford, Ill., Proposed plan, 706.
 —Seattle, Wash., Purchase offer, 389, 749, 872.
 Municipal Railway of San Francisco (see San Francisco, Cal.)

N

- Nashville, Tenn.:
 —Nashville Railway & Light Co.:
 —One-man car law, Suit brought, 945.
 —Trainmen talk safety to passengers, 842.
 National Association of Purchasing Agents:
 —Rules governing purchases adopted, 955.
 National Civic Federation:
 —Elimination of waste discussed, 642; Comments on, 607.
 National Conference on Town & City Planning:
 —Planning conference held in New York City, 692; Comments on, 645.
 National Conference on Street and Highway Safety:
 —Hoover sees progress in program, 348.
 National Electric Light Association:
 —Annual meeting, Report, 1017.
 Newark, N. J.:
 —Public Service Ry.:
 —Annual report, 590; Comments on, 569.
 —Bus lines purchased, 671.
 —Bus used on inspection trips, Design, *54.
 —Fare readjustment, 557, 595.
 —One-man car operation, Details, *363.
 —Route numbers for bus lines, *413.
 —Surface car maintenance, 418.
 —Twenty passengers injured, Jersey City, *198.
 New Bedford, Mass.:
 —Union Street Ry.:
 —Accident prevention campaign election day, 34.
 —Bus monopoly sought, 905.
 —Emergency tool boxes relieve blockades, *104.
 New Brighton, Pa.:
 —Beaver Valley Traction Co.:
 —Cars scheduled to meet trains, *655.
 —Community entertained at Christmas, 40.
 —Employee safety record, 852.
 —Newspaper advertisement, 1028.
 —Presented with Alice safety award, 483.
 —Reduced fares on Dollar Day increases revenue, 416.
 —Sales letter to employees, 811.
 —Sunday pass installed, *889.
 —Traffic increase on bus lines, *851.
 —Weekly bulletin to employees, 190.
 Newburgh, N. Y.:
 —Two years of all-bus operation, *813.
 —New England Street Railway Club:
 —Anniversary meeting, Officers elected, 546.
 —Car painting and A.E.R.A. co-operation discussed, 896.
 —Rolling stock and power plants discussed at February meeting, 265.
 New Haven, Conn.:
 —Connecticut Co.:
 —Bus fare lowered, 237.
 —Bus operation in Bridgeport authorized, 788.
 —Exhibit at Bridgeport show, 1027.
 —Low crowned paving between rails, *104.
 —Movie made of bus maintenance operations, 102.
 —Wage controversy, 946.

- New Haven, Conn. (Cont.):
 —New Haven & Shore Line Ry.:
 Line maintenance, Practice, *458.
 Pipeless furnace installed in car shops, *589.
 Telephone dispatching, *842.
- New Jersey, State of:
 —Bills favoring railway passed, 745.
 —Merger of Trenton-Philadelphia lines reported, 832.
 —Traffic survey by North Jersey Transit Commission, *222; Comments on, 210.
- New Orleans, La.:
 —New Orleans Public Service, Inc.:
 Higher fares necessary, 1026.
 Labor-saving equipment in trackwork [Meyers], 780.
 Rate base reduction, 748.
 Wage increase sought, 744, 906.
- Newport News, Va.:
 —Newport News & Hampton Railway, Gas & Electric Co.:
 Annual report, 790.
- Newport, R. I.:
 —Newport Electric Corporation:
 Co-ordination plan to meet financial emergency, 161.
- Newtonville, Mass.:
 —Middlesex & Boston Street Ry.:
 Emergency valve for one-man cars, *62.
 Tower truck built for overhead construction, 156.
 Wage increase refused by arbitration board, 235.
- New York Central R.R.:
 —Diesel locomotive suggested instead of electrification, 803.
 —Electric locomotives order, Experimental type, Details, *102.
 —Electrification progress out of New York City, 311.
 —Elevated freight and automobile express highway proposal, 235.
 —Yonkers electrification to proceed, 744.
- New York City:
 —Additional subway routes approved, 484, 1028.
 —Brooklyn City Railroad:
 Cars ordered, Details, 126.
 Equipment and interurban securities offered, 122; Comments on, 85.
 New cars, Effect on operation, Details, *1003.
 Safety practices [Hodges], 896.
 Smoking permitted, 787; Comments on, 798.
 —Brooklyn-Manhattan Transit Corporation:
 Accidents reduced by arousing interest in safety, *854.
 Combined ticket and selling agents, 38.
 Elevated platforms to be extended, 747.
 Maintenance practice, discussed by A. E. R. A., 418.
 Motor frames, Reboring for oversize housings [Whitney], *701.
 Order impending for subway cars, 507.
 Shop development plans, 321.
 Track reconstruction and repairing plans, 1925, 835.
 Transfer service advertised, 37.
 —Bus company enjoined from competition with railways, 864, 990.
 —Bus proposals called for, 483.
 —Bus report, Details, 349.
 —Eight Avenue Railroad Co.:
 Compressor overhauling bench, *622.
 Dumbwaiter saves time of shopmen, *470.
 Fire extinguishers, Housing, *650.
 Fixture for bending radial bar rests, *664.
 Fixture for forming handlers on rods, *552.
 Form for bending corner post irons, *703.
 Paint storage, *589.
 Pit jacks, Attachments for, *823.
 Underground storage for oils and paints, *620.
 Wall rack for controller drums, *075.
 —Electrification progress out of, 311.
 —Fifth Avenue Coach Co.:
 Operating statistics, 736.
 —Five-cent fare plan, Report on, 903; Comments on, 876.
 —Governor Smith's comments on transit findings, 312.
 —Injunction to stop city bus program, 159.
 —Interborough Rapid Transit Co.:
 "Bad order" cards for coils, *515.
 Bus operating offer, 199.
 Fare increase asked, 385, 423, 829.
 Lengthening of platforms discussed, 481.
 Maintenance methods, *440.
 Preventing converter brushes from being raised, 858.
 Short circuit causes panic, 827.
 Train operation, Details, *917.
 Verdict favors Manhattan stockholders, 598.
 —Long Island Electric Ry.:
 Foreclosure ordered, 1033.
 Receiver appointed, 279.
 —Long Island R.R.:
 Burned repair shop to be rebuilt, *393.
 Electrification progress, 311.
 Electrification work, Montauk division, 557.
 Jamaica-Babylon electrified line opened, *803; Comments on, 797.
 Mineola line, Electrification planned, 990.
 —Mayor Hylan's transit bills defeated, 521.
 —Merchants urge co-ordinated transportation, 372; Comments on, 361.
 —New subway loan, 482.
 —New York & Harlem R.R.:
 Galvanized-iron sheets used for headlining, *471.
 Repairing car panels, *589.
 Sanding truck saves time, Details, *381.
 Sign lights illuminate fare boxes, *845.
- New York City (Cont.):
 —New York & Queens County Ry.:
 Softening fibre for washers, 823.
 Transfer use reduced, 377.
 —New York Railways:
 Bond exchange with Ninth Avenue Co. sought, 907.
 Bus rights applied for, 593.
 Financial report, 792.
 Paving responsibility considered, 351.
 Public directors named, 278.
 Reorganization plans, 123, 202, 677, 748.
 —New York Rapid Transit Corp.:
 Spring support for portable drill, *105.
 Truck overhauling, Details, *959; Comments on, 957.
 —New York, Westchester & Boston Ry.:
 Interurban extension to be constructed, 321.
 Wheel tread and flange, Finishing, *553.
 —Railways seek bus permits, Comments on, 446.
 —Subway stations lengthened, 315.
 —Third Avenue Ry.:
 Bus franchise applied for, 630.
 Commutators preheated to solder, *702.
 Copper scrap baled, *772.
 Fare decision, Supreme Court, 802, 989.
 Fixture for holding hand drill, *822.
 Heater for soldering irons, *740.
 Maintenance practice, 418.
 One-man car built for, Design, Details, *877, 920.
 Paving and snow costs reduce surplus, 388.
 Testing and inspecting controller drums, *024.
 —Transit Investigation, Findings, Detailed report, 36, 253; Comments on, 49, 245, 246, 302.
 —Transit program, Large expenditures planned, 517.
 —Traffic in terminals, 659.
 —Union Ry.:
 Cars damaged in fire, 605.
 —Westchester Electric R.R.:
 Partial abandonment asked, 239.
 —Yonkers, R.R.:
 Bus service installed, 993.
 Partial abandonment allowed, 317.
- New York Electric Railway Association:
 —Annual meeting, Program, 984.
 —Car design, Comments on, 172.
 —Mid-winter meeting, Report, 146; Comments on, 128.
- New York, New Haven & Hartford R.R.:
 —Bus service to be installed, 992; Comments on, 1002.
 —Cos Cob, Conn. station to be enlarged, 244.
 —Report of electric railways operation, 1924, 638.
- New York Railroad Club:
 —Electrification discussed, March meeting, 549.
- New York, State of:
 —Bill for railway policemen disapproved, 697.
 —Central New York railways ask for bus franchise, 501.
 —Change in traction law approved, 670.
 —Comparison of railway statistics, 1922 and 1923, 121.
 —Westchester County traffic survey, 214; Comments on, 210.
- New York State Rys. (see Rochester, N. Y.)
- New Zealand:
 —Auckland, Bus situation, 353.
 —Christchurch Tramway, Annual report, 276.
 —Royal commission favor tramways, 417.
- Noise reduction:
 —As a good investment, Comments on, 438.
 —Better maintenance will reduce noise, Comments on, 324.
 —Capital Traction Co., Washington, Practice [Miller], *247.
 —Car springs, Proper maintenance will assist, *325.
 —Criticism will not eliminate noise, Comments on, 667.
 —Flexibility would aid [Findley], 890; Comments on, 875.
 —Suggestions for, In car operation [Williams], *765.
- Norfolk, Va.:
 —Virginia Railway & Power Co.:
 Bus plan goes before public, 669.
- Norristown, Pa.:
 —Philadelphia & Western Ry.:
 Light-weight interurban car being tried out, *433.
- Northern Massachusetts Street Ry. (see Greenfield, Mass.):
 —Northern States Power Co. (See Fargo, N. D.).
 —Northern Ohio Traction & Light Co. (See Akron, Ohio):
 —Northern Texas Traction Co. (see Fort Worth, Tex.):
- O
 Oakland, Cal.:
 —Key System Transit Co.:
 Annual report, 670.
 Commission's report on accident, 118.
 Expansion ordered by Commission, 745.
 Ferryboats, Part of equipment, *413.
 Franchise negotiations, 235, 482.
 Pay-as-you-leave installed, 904.
 Safety work, Employees aid, 725.
 Traffic survey, Report, 903.
 Valuation approved by I.C.C., 43.
 Wheel service statistics, 759.
- Oak Park, Ill.:
 —Chicago & West Towns Rys.:
 Bus bodies, Design, Details, *435.
- Ohio, State of:
 —Amendment to bus law is sought, 115.
 —Buses to be controlled by cities, 385.
 —Electrification measure becomes a law, 520.
 —Interurban railways controlled by I.C.C., 73.
 —Statistics of Ohio railways, 1033.
- Oklahoma City, Okla.:
 —Oklahoma Ry.:
 City will co-operate with, 601.
 Court approves service changes, 631.
 Receivers appointed, 79.
 Survey made, Changes recommended, 519; Comments on, 493.
 —Oklahoma Utilities Association:
 —Annual convention, Report, 417.
 —Olean, N. Y.:
 —Olean, Bradford & Salamanca Ry.:
 Bus franchise granted, 707.
- Omaha, Neb.:
 —Omaha & Council Bluffs Street Ry.:
 Annual report, 951.
 Fare advance authorized, 906, 989.
 Jig for cutting circular disks, *382.
 Journal box covers, Tools for making [Wood], *1020.
 Oxyacetylene torch, Use of, Reduces repair costs, *33d.
 Pedestal wear plates, Die-formed, [Wood], *420.
 Poles set with A-frame derrick, 156.
 Self-centering chuck for armature bearings [Wood], *470.
 Omnibuses (see Motor buses).
 One man cars (see Cars, One-man).
 Operating records and costs:
 —Bus operation analyzed by A.E.R.A., 560.
 —Bus operating costs, Beaver Valley lines, *851.
 —Car designs, Relation to operating conditions [Metcalf], 982.
 —Car maintenance costs reduced since 1924, Southern properties, *230, 347, 471, 822; Comments on, 323.
 —Construction costs index [Richey], 15; Comments on, 3.
 —Cost of purchased and generated power compared, Holyoke, Mass., [Pellissier], *541.
 —Gasoline-driven ferry more economical than steam, San Francisco, *264.
 —Georgia Railway & Power Co., Two year comparison, 55.
 —Inspection records, Philadelphia, *95.
 —Light-weight cars effect saving, Milford, Mass., *726.
 —Light weight equipment reduces costs, 265.
 —Materials costs index [Richey], 15; Comments on, 3.
 —Motorcycle freight pick-up reduces costs, Toronto, 204.
 —One-man car operation reduces costs, Newark, N. J., *303.
 —Painting, Spray and hand methods compared [Hurlock], *907.
 —Providence, R. I., Results in plant economy [Slade], *511.
 —Railway costs nearing stabilization [Richey], 15; Comments on, 3.
 —Railway operating statistics, 1924, 709; Comments on, 683, 719.
 —Replacement costs vs. cost of repairs by welding [Lincoln], *101.
 —Reports, Monthly and annual (see Statistics).
 —Tieless track construction costs, Hot Springs, Ark., [Gauthier], *613.
 —Twelve large railways compared, 855.
 —Welding and grinding costs, Detroit [Colby], *463.
- Orange County Traction Co. (see Newburgh, N. Y.).
- Ottawa, Ontario, Can.:
 —Ottawa Electric Ry.:
 One-man, Two-man rebuilt cars, *497.
 Revenue loss charged to bus competition, 313.
- Overhead contact system:
 —A.E.S.C., Plans to standardize overhead line material, 266.
 —Budgeting maintenance for line department [Skellley], 510.
 —Catenary construction:
 Dallas-Denton line [Cooke], *647; Comments on, 646.
 Material tests, 005, *810.
 North Shore Line extension, *583.
 Swiss Federal Rys., *727.
 —Concrete poles used in St. Louis [Hawkins], *226.
 —Derail for bridge crossing, *225.
 —Keeping down maintenance costs, Guilford, Conn., *458.
 —Maintenance practice reduces line failures, Toronto [Neild], *763.
 —Single-phase overhead construction, Virginian Ry., *843.
 —Span wires replace bracket arms, *552.
 —Special construction during grade elimination, Cleveland [Scott], *880.
 —Systematic records reduce line failures [Neild], *763.
 —Trolley wire construction on lift bridge, Houston, Tex. [Greer], *139.
 —Trolley wire hanger, Springlock, *122.
- P
 Pacific Electric Ry. (See Los Angeles, Cal.).
 Painting (including paint shop practice and equipment).
 —Boston "L" shops, Methods, Details, *173.
 —Capital Traction Co. cars, Washington, [Miller], *237.
 —Car, Methods, 347; Comments on, 323.
 —Color of W. B. & A. cars changed, *930.
 —Dipping tank for, *822.
 —Discussed by New England Street Ry. Club, 896.
 —Methods used, Interborough, *440.
 —Oils and pigments used in car painting, Details [Noble], 939.
 —Paint storage, Eighth Avenue R.R., *589.

- Painting (Cont.):
 —Respirator protects workman while spray painting, *792.
 —Spray painting car cables, *704.
 —Spray painting, Cars [Hurlock], *987.
 —Underground storage for paints, *629.
 —Window guard, improved type, for spray painting [Lucas], *612.
- Paving:
 —Asphalt and brick, Rochester, N. Y., *973.
 —Charges eliminated, Pittsburgh, Pa., *799; Comments on, 797.
 —Concrete curb along rail reduces cost of, *95.
 —Concrete mixer, Narrow drum, *590.
 —Concrete paving, Precast, Details, Raymond, Wash., *550.
 —Concrete tamper used, Bangor, *333.
 —Low crowned paving between rails, New Haven, *194.
 —Machine for finishing surface in Milwaukee, *61.
 —Paving controversy, Springfield, Ohio, 947.
 —Paving dispute, Seattle, Wash., 706.
 —Restrictions modified, Charleston, S. C., 947.
 —Sand drying plant cuts cost, Baltimore, *619.
- Payrolls:
 —Prepared by machine, Boston, *839.
 Pennsylvania-Ohio Electric Co. (see Youngstown, Pa.).
- Pennsylvania Railroad:
 —Electrification plans, 73.
 Pennsylvania, State of:
 —Merger of Trenton-Philadelphia lines reported, 832.
 Pensions (see Insurance and pensions).
 Peoples Ry. (See Dayton, Ohio).
 Philadelphia, Pa.:
 —City Transit Commission formed, 803.
 —Frankford, Tacony & Holmesburg St. Ry.: Foreclosure, 1024, 1033.
 Receivers appointed, 279.
 —Philadelphia Rapid Transit Co.: Advertising increased service, *929.
 Annual report, 428.
 Basic wage plan, 744.
 Bond issue offered, 488.
 Cars inspected on wait-hour basis, *95.
 Conowingo power developments, dispute, 424, 518, 629.
 Dividend rate increased, 489.
 Fare controversy, 689, 789, 862, 1024.
 Gas-electric buses, Final road tests, 604.
 Gas-electric buses, Reasons for [Queency], 151.
 Income tax refund sought, 871.
 Lease extension sought, 991.
 Loading platform put into operation, 314.
 Stock sale, 354, *389, *503.
 Students denied fare reduction, 315.
 Surface car subway contract submitted, 272, 949.
 Token holders popular, *620.
 —Subway agreement presented, 37.
- Phoenix, Ariz.:
 —Phoenix Railway Company of Arizona: Abandonment contemplated, 598, 712, 791.
 City may purchase, 701, 1023.
 Franchise controversy, 558.
- Pittsburgh, Pa.:
 —Educational building, Comments on, 1002.
 —Pittsburgh & Beaver St. Ry.: Railway service restored in Ambridge, 826.
 —Pittsburgh Railways: Additional power equipment needed, 1000.
 Annual report, 562.
 Charter sought for subsidiary bus company, 160.
 Coupon books, Extend transfer privileges, *62.
 Derrail, Automatic, For steep grades, *1008.
 Dipping tank for fender painting, *822.
 Fares decreased, Washington, Pa., 866.
 Forty-cent Sunday pass to be tried, 386.
 Gear case clamps made on rivet machine, *859.
 Guard protects workmen using metal shears, *1021.
 Lewis' Pittsburgh Guide, Railway edition, 100.
 New cars ordered, specifications, 717.
 New fare rates effective, 708.
 Publicity improves public relations [Fitzgerald], 986.
 Recreational buildings for employees, 830.
 Rehabilitation brings improvements, *799; Comments on, 797.
 Rerouting and through routing authorized for 60 days, 272.
 Selling service by use of pass and posters, *366.
 Slack adjusters, Pin type, *1021.
 Springs keep tension on armature wire, *943.
 Track construction equipment, Details, *971; Comments on, 957.
 Track tools, Box for, *1021.
 Traffic regulations aid operation, *847.
 Truck parts made, Details, *974.
 Trucks, Car, Transfer table for, *976.
 —Subway developments, 38, 234, *400; Comments on, 396.
 —Utility building dedicated, *1024.
 —Utilities reorganization, 1032.
 —West Penn Ry.: Co-operation of civic bodies sought, 38.
 Fares increased, 904, 949.
 Property sold, 598.
- Poles (see also Overhead contact systems and Wood Preservation):
 —Concrete: Manufacturing plant, Baltimore, Details [Wyser], *691.
 St. Louis, Mo., Construction [Hawkins], *260.
 —Concrete setting for [Foster], 472.
 —Earth drill, Power driven, For pole work, *742.
 —Hollowspan, Design, *978.
- Poles (Cont.):
 —Maintenance budgeting for [Skelley], 510.
 —Pole straightening methods, *773.
 —Set with A-frame derrick attached to tower truck, 156.
 —Steel: Copper bearing steel poles, 157.
 Pomona, Cal.:
 —Transportation problem, 608.
 Port Chester, N. Y.:
 —New York & Stamford Ry.: Fares increased, 830.
 Portland, Me.:
 —Cumberland County Power & Light Co.: New holding company finances, 486.
 Offer made for stock, 291.
 Portland, Ore.:
 —Portland Electric Power Co.: Franchise, New, Considered by City Council, 904.
 Income tax ruling, 995.
 Service to be extended, 38.
 Signal Failures decrease [Charters], 268.
 —Transportation service extensions discussed, 77.
 Pottsville, Pa.:
 —East Penn Electric Co.: Weekly pass adopted, 860.
 Poughkeepsie, N. Y.:
 —Poughkeepsie & Wappinger Falls Electric Ry. Babbitt bearings increase life, *943.
 Commutator segments installed in shop, *901.
 Motor for track grinding used in shop, 976.
 New fare schedule effective, 746.
 Steel trends save wear on floor, 975.
 —Power contract, Illinois Central R.R., 63.
- Power distribution:
 —Berlin suburban electrified lines, *503.
 —Catenary construction on North Shore Line extension, *589.
 —Converters, synchronous, San Francisco, [Woodbridge], *573; Comments on, 569.
 —Instructions for repairing underground cables, Baltimore, 67.
 —Meters used as reverse-current relays, 623.
 —Method used on Dallas-Denton electrified line [Cooke], *647; Comments on, 646.
 —Methods used on New Haven & Shore Line Ry., *458.
 —Relay for calibration, 1022.
 —Switchboard instruments, 944.
- Power generation:
 —A. E. R. A. committee report, 514.
 —Holyoke, Mass., Contract, Details [Pellissier], 541.
 —Illinois Central Railroad, Contract for, 63.
 —Pars electrified railways, *376.
 —Philadelphia plans opposed by railway, 424.
 —Swiss Federal Rys., Details, *727.
- Power stations & equipment:
 —Load indicator for transformers, *421.
 —Rehabilitation, Providence, R. I. [Slade], *511.
 —Switchboard instruments, Improved types (G. E.), 231.
- Power transmission:
 —Construction on Long Island R. R., *799.
 —Improvements at Providence [Slade], *511.
 —Methods used, Swiss Federal Rys., *727.
 —Parallel lines insure power continuity, *652.
 —Superpower and its relation to railways, [Sniffin], 112.
 —Virginia Ry., Electrified lines, *843.
 Prescott, Dick, *106, *343, *471, *623, *773, *975.
- Providence, R. I.:
 —United Electric Rys.: Annual report, 639.
 Power system improvements [Slade], *511.
 Wage arbitration, 631.
- Publicity: (See also Merchandising Transportation)
 —Circulars advertise bus party service, Beaver Valley, *851.
 —Discussed at annual convention of Indiana Public Utility Assn., 193.
 —Interurban special service advertised, Ft. Worth, *1015.
 —Posters increase traffic, Pittsburgh, Pa., *366.
 —Seattle municipal railway advertising, Comments on, 729.
 —Service increased by advertising, Philadelphia, *929.
 —Time table on bulletin increases traffic, Boston, *222.
 —Time-table racks in hotel lobbies, Comments on, 172.
 —Work of A. E. R. A. manufacturers special committee on cooperation, 229.
- Public Relations with:
 —Advertising will improve [Esch], 290.
 —Better transportation wanted, not cheaper [Witt], 269.
 —Community entertained at Christmas by Beaver Valley Traction Co., 40.
 —Co-operation with merchants, Dollar Day fare reduction, 416.
 —Co-ordinated bus and railway service will be future demands [Buffe], 892.
 —Courtesy, Weather should not affect, 160; Comments on, 127.
 —Delays in service, Patrons should have information, Comments on, 362.
 —Differential fares improve [Jackson], 980.
 —Discussed by Metropolitan Section, A. E. R. A., 114.
 —Discussed by Wisconsin Utilities Association, 660; Comments on, 645.
 —Good will ads reprinted by Westinghouse, 753.
 —Increasing confidence to railway future [Reid], 111.
 —Interurban express service improves, Ft. Worth, *1015.
- Public Relations with (Cont.):
 —Methods used to improve, Pittsburgh, Pa., *799; Comments on, 797.
 —North Shore line makes friends of patrons, 379.
 —Operating men realize obligations to patrons, Comments on, 59.
 —Pass and posters sell service, Pittsburgh, Pa., *306.
 —Publicity improves, Pittsburgh, Pa. [Fitzgerald], 986.
 —Railway problem is better understood [Storrs], 783.
 —Reading Transit Co., Lebanon line, merchants lease for a day, 520.
 —Selling transportation in Ft. Worth, Comments on, 1001.
 —Service for exceptional crowds, Comments on, 684.
 —Service will increase revenue, 597.
 —Signs direct passengers to loading platforms, 849.
 —Smoking allowed on Brooklyn Cars, 787; Comments on, 798.
 —Zone check system of fare collection improves relations, [Best], *143.
 Public Service Ry. (see Newark, N. J.)
 Public service and regulative commissions:
 —City Transit Commission formed, Pittsburgh, Pa., 863.
 —Interstate Interurban railways controlled by I. C. C., 73.
- Quebec, Can.:
 —Quebec Railway, Light & Power Co.: Franchise agreement, 789.
 Income bond payment declared, 488.
- R
- Radio:
 —Broadcasting, Baltimore, Md., *1025.
 —Relation to high-voltage insulators, 147.
- Rail joints and bonds:
 —Carbon arc welding, Chicago [Wolfe], 609.
 —Failures reduced, Methods, Boston, 858.
 —Pre-welding prevents service interruption, Birmingham [Taurman], *537.
 —Repeated impact tests, A. E. R. E. A. committee, *252.
 —Testing and maintenance practice, 25 rail-ways, *87; Comments on, 86.
 —Truss rail for repairing, *344.
 —Welded rail joints, A. E. R. E. A. report, 302.
 —Welding practice: Boston Elevated [Steward], 609.
 Eastern Massachusetts [Walker], 698.
 Washington, D. C., [Dalglish], 701.
- Rails:
 —"In situ" Results with, Toronto, *1016.
 —Pre-welding prevents service interruption, Birmingham [Taurman], *537.
- Railways:
 —Australian Commission report, Tramways favored, 417.
 —Bus competition, Significance of [Chase], 899.
 —Business building methods discussed at C. E. R. A. meeting, 931.
 —Bus operation by, 1924, Statistics, 7, 61; Comments on, 2.
 —Bus permits sought, Comments on, 646.
 —Census report shows status of, 395; Comments on, 264.
 —Centralization of government advocated [Hoover], 829.
 —Changing conditions and problems [Shannahan], 547.
 —Consolidation would bring prosperity [Storrs], 933.
 —Continued improvement expected, 533.
 —Co-operation with motor vehicle associations urged [Dahl], 294.
 —Estimate of industry budget in 1925, 4.
 —Financial outlook, 1924 reviewed, 26; Comments on, 1.
 —Future of electric railway [Buffe], 892.
 —Improvements the industry overlooks, Comments on, 837.
 —Increasing confidence in future of, [Reid], 111.
 —Inflexible operating rules may injure service, Comments on, 683.
 —Interstate statistics by I. C. C., 1923, 697.
 —Manufacturer's contribution to electric railway [Barry], 203.
 —Newspaper comments on place of, 520; Comments on, 493.
 —Operating methods in nineteen cities, Observations on, [Witt], 289.
 —Operation discussed by Cal. E. R. A., 856.
 —Operating statistics of industry, 1024, 709; Comments on, 719.
 —Operations of 12 large properties, 855.
 —Relation between automotive and railway industries [Dahl], 294.
 —Review of events 1924 [MacMurray], 9.
 —Securities as an investment, 909; Comments on, 876.
 —Service rendered indispensable [Storrs], 783.
 —Statistics compared, Southern states, *655.
 —Transportation discussed at A.E.R.A. Mid-year Meeting, 286.
 —Transportation men should run transportation systems [Brush], 297.
 —Transportation situation, Texas cities [Gordon], *1000.
- Rapid transit:
 —A. E. R. A. committee report, 551.
 —Detroit plan may be confined to town, 629.
 —Financing construction of, Methods [Smith], 35.
 —Financing extensions, Hamburg [Stein], 655.
 —London tube reopened, Construction details, *141.
 —Los Angeles, Subway terminal for, *179.

- Rapid Transit (Cont.):**
 —New York City, Extensions planned, 373, 482, 484, 517, 991, 1028; Comments on, 301.
 —North Shore Line opens new extension, Details, *583.
 —Pittsburgh, Pa., Subway construction proposed, *409; Comments on, 390.
 —Staten Island tunnel to be constructed, 668.
 —Suggested by engineers, Los Angeles, Cal., *731.
 —Traffic growth, N. Y. C., 10 years, 378.
 —Train operation, Interborough, New York City, Details, *917.
- Raymond, Wash.:**
 —Willapa Electric Co.:
 Precast concrete paving, *505.
- Reading, Pa.:**
 —Reading Transit & Light Co.:
 Merchants lease Lebanon lines for a day, 520.
- Receiverships (see Financial):**
 Rensselaer, N. Y.:
 —Buses give improved service, *65.
- Repair shop practice, Cars and car equipment:**
 —Armatures.
 Air cylinder presses out bearings, 741.
 Bend of solder shows clearance [Lynch], 231.
 Bearing and housing fits [Whitney], *451.
 Boring bearing housings, *942.
 Buffing and polishing machine for, 516.
 Callipering inside end bells, *740.
 Carriage for moving, *771.
 Chicago Surface Lines, Methods [Shaughnessy], 509.
 Clamp for holding, *343.
 Coil spreader, Improved type, *944.
 Dipping and baking, 864, *702.
 Harrisburg Ry., method reduces pull-ins, *91.
 Maintenance practice, Syracuse [Worlock], *757.
 Winding machine for, *741.
 —Axle bearing faces finished in small planer [Reiff], *106.
 —Axle bearings dowels hold for drilling, *105.
 —Axle caps, Drilling dowel holes in, *772.
 —Babbitt melting pot, Thermostatic control, *209.
 —Babbitting practice, Twin City Rapid Transit Co., *93.
 —Band saw expedites metal cutting, [Hott], *107.
 —Brake-rod casting, Lubricated, *340.
 —Brush-holder carbon ways, Repairing, *624.
 —Car bodies raised with sling, *900.
 —Car cables, Overhauling methods, 195.
 —Car cleaning methods of Boston "L" [Johnson], 897.
 —Car panels repaired with sheet steel, *589.
 —Car springs, Maintenance of, Twin Cities, Details, *325.
 —Cleaning armature cores by sand blast, 473.
 —Commutator segments installed in shop, Methods, *991.
 —Commutator slotter combined with banding lathe, *703.
 —Commutators preheated to solder, *702.
 —Commutators protected during storage, *665.
 —Compressor overhauling bench, *622.
 —Compressor cylinders, Relining practice, 976.
 —Dasher card racks, Altoona, Pa., *70.
 —Destination signs maintenance, 772.
 —Double boiler for heating pinions, *823.
 —Electric arc welding for cars [Lincoln], *101.
 —Fare boxes, Practice in St. Louis, *99.
 —Fixture for bending radial bar rests, *664.
 —Fixture for drilling axle bearing cap, *107.
 —Form for bending corner post irons, *703.
 —Galvanized-iron sheets for headlining, *471.
 —Gear case clamps, Rivet machine for, *859.
 —Grinder, car wheel, *422.
 —Hangers clamp pipes to framework, *157.
 —Inspection reduces pull-ins, Kansas City, *329.
 —Jack for underbody car equipment, *380.
 —Jig for grinding triple valves, *315.
 —Journals, Harrisburg Ry., Practice, *91.
 —Knuckle joint connectors, Use of, 865.
 —Melting babbitt from bearings, Toronto, *380.
 —Motorman's valve, Apparatus eliminates sticking, [Hott], 156.
 —Newark, N. J., Surface car maintenance, 418.
 —Pedestal gib plates, Forming, *622.
 —Pedestal jaw castings, Machining, *342.
 —Pedestal wear plates, Die formed [Wood], *420.
 —Pinion puller, Screw-type, *665.
 —Pit hoist, Suspended, for motors, *771.
 —Pit licks, Attachments for, *823.
 —Pit tool boxes reduce time of bus repairs, *489.
 —Platform controllers rebuilt, Syracuse, *609.
 —Preventing air pipes freezing, 269.
 —Push pins for wheel removal, *704.
 —Rebabbitting bearings, *943.
 —Reboring compressor cylinders, Syracuse, *664.
 —Reconditioning motors to increase bearing mileage, *473.
- Repair shop practice, Cars and Car Equipment (Cont.):**
 —Repairs before excessive wear, Comments on, 607.
 —Roller bearings for worn trolley bases, *858.
 —Sand outlet attached to trucks, *1014.
 —Sandpipe beater, Electric, *345.
 —Self-centering chuck for armature bearings [Wood], *470.
 —Shop trucks, Roller bearing, *606.
 —Sign printing, silk screen, Used in Detroit [Williams], *261.
 —Slack adjusters, Pin type, *1021.
 —Sheet cutters made from trolley wheels, *742.
 —Softening fiber for washers, 823.
 —Special wheel shop, Dayton, *025.
 —Spraying varnish inside motor frames, *515.
 —Springs keep tension on armature wire, *943.
 —Steel safety treads protect floor, 975.
 —Swing link for suspending car bodies, *474.
 —Tank for heating and cleaning pinions, 71.
 —Testing drawbars on cars, *344.
 —Thorough repairs are cheapest, Comments on, 755.
 —Truck overhauling, N. Y. C., *950; Comments on, 957.
 —Truck parts made, Pittsburgh, Pa., Details, *974.
 —Trucks, Car, Transfer table for, *976.
 —Truck squaring device [Ferguson], *420.
 —Truck standardization reduces maintenance, 865.
 —Wall rack for controller drums, *975.
 —Wheel maintenance, Denver, *327.
 —Wheel maintenance reduced, Detroit [Colby], *463.
 —Wheel tread and flange, Finishing, *553.
 —Wheel flanges built up by welding, 108.
- Repair shop practice, Shops and shop equipment.**
 —Acetylene generators installed, Rochester, *858.
 —Acetylene torch, Combination pressure, *901.
 —Acid pot saves material, *624.
 —Arc welder, Portable, *066.
 —Arc welding machine, Portable, 106.
 —Automatic arc welder, 626.
 —Babbitting bearings, Minneapolis, *93.
 —Babbitting methods, Interborough, *449.
 —Band saws, Motor driven, *977.
 —Bulldozer, Pneumatic, For forge shop, *71.
 —Cabinet for workmen's tools and supplies, Dallas [Brown], *942.
 —Chain block, ball-bearing, *231.
 —Circular saw flier, *553.
 —Circular saw, Portable [Mitchell], *157.
 —Clamp, Pneumatic mortising, [Brown], *974.
 —Compressed air used by New York State Rys., *704.
 —Controllers for shop motors, 346.
 —Copper scrap baled, *772.
 —Cyanide hardening process, Chicago, *337.
 —Dick Prescott, *106, *343, *471, *623, *773, *975.
 —Drill, Electric, New type, *774.
 —Drill grinder, Portable electric, *860.
 —Drill grinder prolongs life of drills, *194.
 —Dumbwaiter saves time of shopmen, *470.
 —Electric tapper, Portable [Black & Decker], 108.
 —Electrode holder, Quick change, For Welding (G. E.), 108.
 —Fixture for forming handles on rods, N. Y. C., *552.
 —Fixture for holding hand drill, *822.
 —Furnace, Oil burning portable, *859.
 —Fuse, Knife-blade, Renewable, 666.
 —Gas furnace blower, *774.
 —Generator, Acetylene, Portable, *944.
 —Grinding and buffing machines, *345.
 —Guard protects workman using metal shears, *1021.
 —Hammers, Six sizes, Motor driven, *106.
 —Heater for soldering irons, *740.
 —Hoists, electric, Five types (American), *270.
 —Jack Roller top for, *824.
 —Jigs for cutting circular disks, *382.
 —Jigs expedite drilling, Columbus, Ohio, *335.
 —Journal box covers, Tools for making [Wood], *1020.
 —Lift trucks, Electric, *824.
 —Limit switch for motor-operated shop doors, 474.
 —Machine vise, For irregular shaped pieces, *346.
 —Maintenance practice, Interborough, *440.
 —Motor for track grinding used in shop, 976.
 —Oxyacetylene torch, Use of, Omaha, *336.
 —Pneumatic drill on work bench, *70.
 —Pneumatic wood-boring machine, *626.
 —Power hammer, Mechanical, [Blacker], *232.
 —Sander, Portable electric, [Barker], *270.
 —Shaper, Geared, Eight speeds, *195.
 —Spring support for portable drill, *105.
- Repair Shop Practice, Shops and Shop Equipment (Cont.):**
 —Squaring shear, Power-driven, Boston "L", *420.
 —Starting switch for shop motors, 902.
 —Telescoping boom for truck cranes, *860.
 —Tool boxes, Emergency, Union Street Ry., *104.
 —Tools, Well-maintained, increase production, Comments on, 755.
 —Travel carriage for arc welding (G. E.), 72.
 —Universal saw, Motor-driven, *474.
 —Valve for discharging water from air lines, *902.
 —Welding flux, How to use, 474.
 —Woodworking machine combination, *534.
- Repair shops and equipment (see also Painting and Repair shop practice):**
 —Carhouse converted into repair shop, Columbus, Ohio, *456.
 —Improvements in Pittsburgh Ry. shops, *799; Comments on, 707.
 —Long Island R.R. to rebuild burnt shop, *393.
 —Modern equipment may effect economies, Comments on, 608.
 —Paint shop, Boston "L", Details, *173.
 —Interborough Rapid Transit Co., *440.
 —Pipeless furnace installed in Guilford, Conn., car shops, *589.
 —Relation to service, Comments on, 85.
 —Statistics for, 258.
 —Wiring and fire protection, Boston "L", Details, *499.
- Rerouting:**
 —Atlanta, Ga., Beejer recommendations, *181.
- Resistors:**
 —Baggage car equipped with, Jackson, Mich., [Seybold], *580.
 —Installed inside cars, Fargo, N. D., 195.
 —Mounting, Method of, Syracuse, *231.
- Richey's conspectus of indexes, 165, 350, 524, 635, 675, 832, 1032.**
- Richmond, Va.:**
 —Virginia Railway & Power Co.:
 Annual report, 868.
 Bus petition filed, 272.
 Coordinated transportation planned, 992.
 Fares increased, 830.
 Stone & Webster purchase property, 833.
 Valuation report, 870.
- Robberies:**
 —Prevention of, Present need, Comments on, 390.
- Rochester, N. Y.:**
 —Bus plan for suburbs, 312.
 —Independent bus owners petition to operate lines, 351.
- New York State Rys.:**
 Acetylene generators installed, *858.
 Agreement with employees drafted, 483.
 Axle caps, Drilling dowel holes in, *772.
 Board shows location of cars, *770.
 Boring armature bearing housings, *942.
 Brush-holder carbon ways, Repairing, *624.
 Bus expansion, 426, 484, 948.
 Callipering end bells of armatures, *740.
 Canal bed line operation sought, 990.
 Car cables, Overhauling methods, 195.
 Carriage for moving armatures, *771.
 Commutator slotting and banding practice, *703.
 Commutators protected during storage, *665.
 Compressed air used in repair work, *704.
 Doors, Front and rear operation, *1020.
 Double boiler for heating pinions, *823.
 Fare boxes illuminated, *737.
 Financial reports, 203, 317.
 Fitted bearings have long life, Method, 553.
 Interurban fares increased, 708.
 Jack, Roller top for, *824.
 Motor maintenance methods, Syracuse [Worlock], *757.
 New motors and trucks purchased, 681.
 Pedestal gib plates, Forming, *022.
 Pinion puller, Screw type, *665.
 Platform controllers modernized, *609.
 Push pins for wheel removal, *704.
 Reboring compressor cylinders, *664.
 Resistors, Method of installing, *231.
 Roller bearings for trolley bases, *858.
 Safety Valve on door engine prevents slamming, *900.
 Sheet cutters made of trolley wheels, *742.
 Spray painting car cables, *704.
 Track pavement, New type, 973.
 Valuation reduced, 350.
 Wage contract renewed, 744, 825.
 Winding machines for armatures, *741.
- Rockford, Ill.:**
 —Municipal ownership plan proposed, 706.
 —Railway franchise awarded new company, 198, 350.
- Rockford City Traction Co.:**
 Franchise controversy, 198, 350, 785, 826.
 Franchise won by vote, 1026.
- Rockford & Interurban Ry.:**
 Fares lowered, 906.
- Rock Island, Ill.:**
 —Tri-City Railway of Illinois:
 Relief measures sought, 861.

Abbreviations: *Illustrated, c Communications.

READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX

Rolling stock (see Cars and Locomotives):
Route Signs:
—Better bus route marking needed, Comments on, 532.
—Boston "L", Transparent signs on windows, *105.
—New system, Glasgow, Scotland, 276.
—Numbers for bus lines, Newark, N. J., *413.
—Signs at stations would increase riding, Comments on, 910.
—Signs direct passengers to loading platforms, 849.
—Silk screen sign printing, Detroit [Williams], *261.
Russia:
—Electrification progress, 867.

S

Sacramento, Cal.:
—Sacramento-Northern Railroad: Annual report, 599.
Safety Work:
—Accident prevention work, Chicago Surface Lines, 37, 313.
—Accidents reduced, Columbus, Ga., 377.
—Automatic barriers protect highway crossings, North Shore line, *543.
—Accident awards to trainmen, 274.
—Campaign to reduce accidents, Boston "L", 185.
—Discussed by Metropolitan Section, A. E. R. A., 114.
—Education and uniform traffic laws urged [O'Connor], 113.
—Employee safety record, Beaver Valley, 852.
—Employees aid, Oakland, Cal., 725.
—Fire fighting apparatus, Everett shops, Boston "L", Details, *499.
—Highway crossing signals important, Comments on, 797.
—Honor roll system reduces accidents, Dayton, Ohio, 252.
—Hoover sees progress in highway safety program, 348.
—Insurance costs reduced by [Scott], 508.
—Literature distributed to aid, Baltimore, 544.
—Montreal safety week, 1026.
—Preventing grade crossing and highway accidents [Muir], 111.
—Progress report, National Safety News, 730.
—Removal of fenders reduces accidents in Baltimore, 34.
—Rice safety award won, by Beaver Valley Trac. Co., 483.
—Safety parade, New York City, *780.
—Safety practices in Brooklyn [Hodges], 896.
—Safety week, Detroit, Politeness emphasized, *827.
—Steady efforts achieve results, Comments on, 798.
—Steps painted white reduce accident hazard, Altoona, Pa., *220.
—Subway for street car passengers, San Francisco, *216.
—Sustained efforts bring success [Williams], c889.
—Trainmen talk safety to passengers, 842.
St. Catharines, Ont., Canada:
—Niagara, St. Catharines & Ontario Ry.: Locomotives built, Details, *853.
St. Joseph, Mo.:
—St. Joseph Railway, Light, Heat & Power Co.: Customer-ownership campaign, 355.
St. Louis-Kansas City Short Line R. R. (See St. Louis, Mo.)
St. Louis, Mo.:
—Bus legislation proposed for, 36, 199.
—Mental test for autoists may be required, 39.
—Railway service interrupted by storm, 38.
—St. Louis-Kansas City Short Line Ry. Personnel disclosed, 480.
—Permission sought to operate new line, 314, 669.
—Permit denied, 989.
—Traffic ordinances in effect, 37, 949, 991.
—Transit situation, Details [Buck] and [Stocks], *397; Comments on, 395; [Jackson], c545; [Fitzgerald], c545; [Smith], c586.
—United Railways Company of St. Louis: Accident reduction in twelve months, 928.
—Bus co-operation offered by competing company, 905.
—Bus lines expanded, 315, 648.
—Cartoon of transit situation, *557.
—Concrete poles used, installation and storing [Hawkins], *220.
—Fare boxes, inspection and repair, *99.
—Line truck used for maintenance, *268.
—Loan Association enables employees to buy homes, 39.
—Reorganization, 318, 907.

St. Louis, Mo. (Cont.):
Signs direct passengers to loading platform, *840.
Transit situation, Details [Buck and Stocks], *397; Comments on, 395; [Jackson], c545; [Fitzgerald], c545; [Smith], c586.
Salt Lake City, Utah:
—Salt Lake, Garfield & Western Ry.: Offered to city as gift, 872.
—Utah Light & Traction Co.: Annual report, 714.
Salt prevents freezing of track switches [Meyerherm], *881.
San Antonio, Texas:
—Transit situation [Gordon], *1009.
San Diego, Cal.:
—San Diego Electric Ry.: Accident awards to trainmen, 274.
St. Paul City Ry. (see Minneapolis, Minn.)
Sand dryers:
—Baltimore, Md., Modern plant, Details, *619.
—Kansas City, Mo., Plant and methods, *414.
Sanford, Me.:
—York Utilities Co.: Bus plans, 483.
Weekly pass installed, 483.
San Francisco, Cal.:
—Market Street Ry.: Annual report, 354.
Concrete setting for poles [Foster], 472.
Motor tower wagons, Details, 1920.
Pole-straightening methods, *773.
Substation developments, Details [Woodbridge], *573; Comments on, 569.
Subway for street car passengers, *216.
—Municipal Railway of San Francisco: Annual report, 354.
Engineer's report, 1028.
Car purchase undecided, 644.
Municipal operation, result of, 239.
Wage increase asked, 117, 271.
—Napa & Callstoga Ry.: Annual report, 480.
—Rapid transit tunnel to be built, 669.
—San Francisco-Sacramento R. R.: Annual report, 833.
Billboard advertising changed monthly, *192.
Gasoline-driven ferry, Economical, *264.
—Subway on waterfront completed, 826.
Schedules & time tables:
—Boston "L" timetables, *839.
—Carry local information, Aurora, Ill., 341.
—For public distribution, Davenport, Iowa, *304.
—Clerks check headways, Interborough, Details, *917.
—Headway recorder checks crossing delays, *251.
—Inflexible rules may injure service, Comments on, 683.
—Railroad and interurban, Dallas-Denton line [Cook], *647; Comments on, 646.
—St. Louis, Mo., Schedule requirements [Buck and Stocks], *397; Comments on, 395.
—Schedule speed increased, Brooklyn, *1003.
—Trolley scheduled to meet trains, Beaver Valley, *655.
Schenectady, N. Y.:
—Schenectady Ry.: Quarterly report, 792.
Transfer, New form, adopted, *888.
Scranton, Pa.:
—Lackawanna & Wyoming Valley R. R.: Wages increased, 272.
—Scranton Ry.: Property sold to Fitkin interests, 428.
Two arbitrations in progress, 668, 949.
Sea Cliff, L. I., N. Y.:
—Nassau County Ry.: Service suspended, 80.
Seate:
—Berlin system, Longitudinal, *689.
—Dayton, Ohio, Rebuilt one-man cars, *309.
—Grand Rapids sample car, Arrangement, *529, *721, *767, 807; Comments on, 719.
—Los Angeles, Seat rearrangement, *545.
—Ottawa, Rebuilt one-man two-man cars, *497.
—Third Avenue Rty. one-man cars, *877.
Seattle, Wash.:
—City must pay tax on railway property, 673.
—Seattle & Rainier Valley Ry.: Municipal ownership, Purchase offer, 389, 677, 714, 749, 833, 872, 950, 991.
Paving dispute, 706.
Property to be appraised, 202.
—Seattle Municipal Ry.: Advertising program, Comments on, 720.
Annual report, 908.
Deficits explained, 995.
Newspaper advertising, *1028.
Progress during six years, 832.
Tax suit, 884, 995.
Second Avenue Ry. (See New York City).
Service and tower trucks:
—Dump trains haul track material, Birmingham [Tauman], *537.
—Electric lift truck, *824.
—Motor tower wagons, San Francisco, Details, 1020.

Service and Tower Trucks (Cont.):
—Motor trucks for track work, Pittsburgh, Pa., *971; Comments on, 957.
—Roller bearing shop trucks, *600.
—Sanding truck saves time, New York, Details, *381.
—Service trucks used on Boston "L", Telephone dispatched, 144.
—Storage battery service trucks, K. C., *453.
—St. Louis, For maintenance of overhead and underground distribution systems, *268.
—Tower truck built by Middlesex & Boston St. Ry., *155.
—Track maintenance equipment mounted on trucks, *155.
—Track materials transported by trucks, Baltimore, *465.
—Truck mounted arc welder, *600.
Shawnee, Okla.:
—Shawnee-Tecumseh Traction Co.: Reduced fare books authorized, 559.
Shreveport, La.:
—Shreveport Railways: Fare increase asked, 162, 669.
Signals:
—Automatic, car-counting, For single track lines, *850.
—Automatic, On North Shore line, *543.
—Failures decrease, Portland, Ore. [Charters], 208.
—Headway recorders check crossing delays, *251.
—Highway crossing signals important, Comments on, 797.
—Maintenance methods reduce failures, 774.
—Signal system changed, London, 735.
Sioux City, Ia.:
—Sioux City Service Co.: Wage readjustment, 789, 904.
Skip-stop (see Stopping of cars).
Snow and ice removal:
—Diak harrow removes snow from streets, Auburn, N. Y., 375.
—Ice cutter on truck frame, *421.
—Railway equipment used to remove snow, Toronto, *144.
—Removal by railway would mean loss, York, Pa. [Wayne], c264.
—Salt prevents freezing of track switches [Meyerherm], *881.
—Sleet cutters for trolley wire made from trolley wheels, *742.
—Snow scrapers for cars, (Root Spring), *270.
Society of Automotive Engineers:
—Los Angeles branch discusses traffic congestion, 737.
Southwestern Public Service Assn.:
—Annual convention, Report, 776.
South Carolina Gas & Electric Co. (see Spartanburg, S. C.).
Southern Indiana Gas & Electric Co. (See Evansville, Ind.).
Spain:
—New railway opened, 634.
Spartanburg, S. C.:
—South Carolina Gas & Electric Co.: Trolley-bus ordinance before voters, 706, 802, 875.
Special trackwork:
—Inspections for, [Gennett], c378.
—Requirements and amount in service, 533.
Spokane, Wash.:
—Spokane & Eastern Railway & Power Co.: Power station sold, 907.
Springfield, Ill.:
—Illinois Power Co.: Annual report, 676.
Springfield, Mass.:
—Springfield Street Railway: Arbitration sought, 906.
Union rejects arbitration proposal, 592.
Springfield, Ohio:
—Indiana, Columbus & Eastern Traction Co.: Map, Electrified, attracts shippers at convention, *929.
—Springfield Ry.: Paving controversy, 947.
—Springfield & Xenia Ry.: Annual report, 526.
Standardization:
—American Engineering Standards Com.: Advisory committee on waste appointed, 661.
Bolt, Nut & Rivets, 114.
Officers elected, 69.
Track bolts, Proposed standards, 417.
—Effect on electric railways:
—Electrification, Urged at A. I. E. E. meeting, 816.
—Need for, Discussed by N.E.L.A., 1017.
—Overhead line material, 269.
—Pipe hangers and fittings, 588.
—Special trackwork, Comments on, 246.
—Specifications changed by A.S.T.M., 546.
—Stores department, Work of [Campbell], 1018.
—Truck, Reduces maintenance, Des Moines, 965.

- Standardization (Cont.):
—Would reduce manufacturing and selling costs [Barry], 293.
- Statistics:
—Abandonments, 1924 reviewed, 20, 31.
—Accident reduction, 12 months, St. Louis, 928.
—Automotive equipment, Railway purchases, 1924, 7, 61; Comments on, 2.
—Bond issues and maturities, 1924, 20.
—Bond testing and maintenance practice, 25 railways, *87; Comments on, 86.
—British steam and electric traffic compared [Jackson], 621.
—Cars, 1924 orders analyzed, 21; Comments on, 2.
—Census report, Details, 305; Comments on, 284.
—Comparison of electrified and steam operation, C. M. & St. P., 338.
—Electric railroad repair shops, 258.
—Electric railway operating statistics, 1924, 709; Comments on, 683, 719.
—Extent of the railway industry, 367.
—Fares in New York State, 1920-24, 121.
—Figures show steady growth of electric railway business, 533.
—Foreclosures, 1924 reviewed, 31.
—Graphs, European tramway, *145.
—Heavy electric traction, 1924 work reviewed, 14.
—Highway fatalities in U. S. [Muir], 111.
—Industries statistics prepared by U. S., 681.
—Interstate railways, 1923, I.C.C., *697.
—Large bus operations analyzed, 736.
—Length of service of officers and employees, Washington, D. C., 258.
—Motor bus, Railway use of, Survey of 156 companies, 5; Comments on, 2.
—New equipment increases merchandising value, 138.
—Ohio city railways, 1033.
—Operations of 12 large railways compared, 855.
—Passengers carried on Interborough, *440.
—Pittsburgh, Pa., Growth during 125 years, *400; Comments on, 396.
—Publication of, Supplies a distinct need, Comments on, 50.
—Pull-in record, Southern Properties, *230, 822.
—Rail joint failures, Boston, 858.
—Railway costs and fares, 1924 [Richey], 15; Comments on, 3.
—Railway service increasing [Storrs], 783.
—Railway operation, 1924, Comments on, 683.
—Ratio of railway taxes to net income, *185.
—Receiverships, 1924 reviewed, 31.
—Reduction of accidents due to removal of fenders, Baltimore, 34.
—Reports, Financial:
 American Brake Shoe & Foundry Co., N. Y. C., 303.
 Atlanta Northern Ry., 676.
 Boston Elevated Ry., 238, 560.
 Boston & Maine R.R., 563.
 Brill Co. J. G., 321.
 British Tramway, 276.
 Cape Electric Tramways, South Africa, 353.
 Chicago, North Shore & Milwaukee R.R., 673.
 Chicago Rapid Transit Co., 748.
 Chicago Surface Lines, 522.
 Christchurch Tramway, Christchurch, New Zealand, 276.
 Cincinnati & Dayton Traction Co., 809.
 Cleveland, Palmsville & Eastern R.R., 489.
 Cleveland Railway, 202.
 Columbus Railway, Power & Light Co., 590.
 Community Traction Co., 635.
 Compagnie Générale Française de Tramways, 807.
 Detroit United Ry., 524.
 Dunith-Superior Traction Co., 525.
 Eastern Massachusetts Street Ry., 635.
 Georgia Railway & Power Co., 791.
 Havana Electric Railway, Light & Power Co., 871.
 Honolulu Rapid Transit Co., 870.
 Hudson Valley Ry., 590.
 Illinois Power Co., Springfield, Ill., 676.
 Illinois Power & Light Corporation, 598.
 Indianapolis Street Ry., 1031.
 International Ry., Buffalo, 432.
 Jamaica Public Service Co., Kingston, Jamaica, 677.
 Kansas City, Clay County & St. Joseph Ry., 636.
 Key System Transit Co., 676.
 Lake Shore Electric Railway System, 489, 870.
 London Street Ry., London, Ont., 277.
 London Underground Rys., 485.
 Louisville Ry., 637.
 Market Street Ry., 487.
 Memphis Street Ry., 995.
 Middle West Utilities Co., 520.
 Municipal Railway of San Francisco, 354.
- Statistics (Cont.):
 Napa & Calistoga Ry., 489.
 National Light & Power Co., 995.
 Newport News & Hampton Railway, Gas & Electric Co., 790.
 New York, New Haven & Hartford R. R., 638.
 New York State Railways, 203.
 North American Co., 525.
 Northern Ohio Traction & Light Co., 675.
 Omaha & Council Bluffs Street Ry., 951.
 Philadelphia Rapid Transit Co., *389, 428.
 Pittsburgh Railways, 562.
 Portland Railroad, 488.
 Public Service Ry., Newark, N. J., 506; Comments on, 560.
 Sacramento Northern Ry., 599.
 San Francisco-Sacramento R.R., 833.
 Seattle Municipal Ry., 908.
 Southern Indiana Gas & Electric Co., 749.
 Springfield & Xenia Ry., 526.
 Tacoma Railway & Power Co., 709.
 Troy & New England Ry., 594.
 Twin City Rapid Transit Co., 387.
 Tygarts Valley Traction Co., 388.
 Union Traction Co. of Ind., 831.
 United Electric Rys., Providence, R. I., 639.
 United Traction Co., 596.
 Utah Light & Traction Co., 714.
 Virginia Railway & Power Co., 868.
 Washington, Baltimore & Annapolis Electric Ry., 713.
 Washington Railway & Electric Co., 278.
 Westinghouse Air Brake Co., 717.
 Westinghouse Electric & Mfg. Co., 835.
 Youngstown Municipal Railway, 318.
- Signal failures decrease, Portland, Ore. [Charters], 268.
—Soil resistivity lowered by salt [Meyerherm], *881.
—Southern states, Railway statistics compared, *655.
—Special trackwork in service, 533.
—Tons of copper in Boston "L" system, 614.
—Track construction, 1924 Reviewed, 17; Comments on, 3.
—Trade statistics incite competition, 913, 955.
—Traffic fluctuations, Boston, *488.
—Traffic growth, New York City, 10 years, 378.
—Traffic in New York City terminals, 650.
—Utility financing, Volume increasing, 654.
—Wheel service, 3 cities, Comparison, 750.
- Stone & Webster:
—Shop report forms used on Texas properties, *454.
—Virginia properties acquired, 1032.
- Stopping of cars (see also Car Loading and Brakes and Compressors):
—Emergency valve for use of passengers, *62.
—Skip-stop plan speeds up service, Boston, 38, *888.
- Stores:
—Accounting for [Weston], 217.
—Automobile storage at interurban terminals, Detroit, *685.
—Bar stock stored in outdoor rack [Porter], *643.
—Coil storage suggestions, [Warner], 106.
—Co-operative buying for small railways, Comments on, 755.
—Millwork stored in racks, *70.
—Paint storage, Boston "L" Details, *173.
—Public utility storekeeping, Practices [Campbell], 1018.
—Sand storage and drying, Baltimore, *619.
—Sand storage, Kansas City, Mo., *414.
—Storage yards well kept, Baltimore, *465.
—Underground, For oils and paints, *620.
- Storm and fire damage:
—Cars damaged in fire, Union Ry., N. Y. C., 695.
—Repair shop burned, Long Island R.R., *393.
—Storm interrupts service, St. Louis, 38.
—Tornado in mid-west, Small damage to railways, 517.
- Street traffic congestion (see also Signals, Street):
—A. E. R. T. & T. A. committee report, 303.
—Atlanta, Ga., Relief suggestions (Beeler), 55, *136, *181.
—City planning effects, Comments on, 798.
—City planning and housing discussed by U. S. C. of C., 856.
—Discussed by Society of Automotive Engineers, Los Angeles, 737.
—Emergency tool boxes installed in New Bedford, Mass., to relieve blockades, *104.
—Increasing speed of car loading at terminals, [Williams], *191.
—Problem in small cities, Comments on, 684.
—St. Louis, Mo., Transit situation [Buck and Stocks], *397; Comments on, 395.
—Studies of congestion in Detroit, 811.
—Subway suggested for relief in Pittsburgh, 234.
—Traffic investigation for relief, North Jersey, *222, Comments on, 210.
- Street traffic congestion (Cont.):
—Traffic problems, Metropolitan [Bartholomew], 818.
—Traffic regulations relieve, Pittsburgh, Pa., *847.
—Tramways better for mass transportation, 417.
—Washington, D. C., How railways handle traffic [Miller], *247.
—Westchester County relief suggestions, *214; Comment on, 210.
- Strikes and arbitrations:
—Atlanta, Ga., Arbitrators grant wage increase, 668, 827; Dissenting arbitrator's digest, 1027.
—Boston Elevated arbitration, Progress, 826, 863, 864, 904, 946, 1024; Comments on, 958.
—Cleveland employees vote against strike, 743, 785; Comments on, 756.
—Grand Rapids controversy ended by arbitrators, 946.
—New Orleans wage question to be arbitrated, 906.
—Newtonville, Mass., Arbitrators refuse wage increase, 235.
—Providence, R. I., Arbitration, 631.
—Scranton, Pa., Two arbitrations in progress, 608.
—Washington, D. C., Arbitrators refuse wage increase, 595.
- Substations and equipment:
—Automatic:
 Maintenance costs and experience with, Cleveland, 931.
 Dallas-Denton electrified lines [Cooke], *647; Comments on, 646.
—Construction features, Long Island R.R., *799; Comments on, 707.
—Developments in practice, San Francisco [Woodbridge], *573; Comments on, 660.
—Holyoke, Mass., Location, [Pellissier], *541.
—Portable, In Bangor, Me., *53.
—Performance on North Shore railway, 931.
—Preventing converter brushes from being raised, 858.
—Rehabilitation, Providence, R. I., *511.
- Subways (see Rapid transit):
—Suspension of service:
 Atlanta Northern Ry., Marietta line, 123.
 Switzerland:
 Geneva:
 Locomotives, Freight and passenger, 407.
 Swiss Federal Rys.:
 Electrification progress, Details, *727.
- Syracuse, N. Y.:
—New York State Rys. (See Rochester, N. Y.).

T

- Tacoma, Wash.:
—Tacoma Railway & Power Co.:
 Annual report, 700.
 Plan suggested for settlement of railway problem, 594.
 Relief suggestions, Report to city council, 313.
- Taxes:
—A. E. R. A. committee report, 300.
—Five-cent fare means taxation hardship, N. Y. C., 903; Comments on, 876.
—Gasoline and weight tax bills passed in Michigan, 274.
—Income tax refund asked, Philadelphia, 871.
—Income tax ruling, Portland, Ore., 995.
—Park tax not in lieu of other taxes, Baltimore, 416.
—Ratio of electric railway taxes to net income, *184.
—Seattle must pay tax on railway property, 673.
- Taxicabs:
—Taxis enjoined from competing with railways, W. Va., 861.
—"No cruising" ordinance recommended, Los Angeles, 866.
- Tennessee Electric Power Co. (see Chattanooga, Tenn.)
- Tennessee, State of:
—Electric power combinations legal, Decision of Supreme Court, 238.
—One-man car law, Suit, Decision, 1025.
- Terminals and Waiting Stations:
—Freight terminal, Youngstown, Ohio, Details, [Graham], *223.
—Railway-bus suburban stations, Detroit, *685.
—Roofed loading station erected, Detroit [Peterson], *653.
—Stations lengthened in Brooklyn, 315.
—Stations on North Shore Line extension, *583.
—Sub-surface terminal for Los Angeles, *170.
- Terre Haute, Ind.:
—Ordinance restricts jitneys, 480.
- Terre Haute, Indianapolis & Eastern Traction Co. (see Indianapolis, Ind.)
- Tests of materials and equipment:
—Air tanks, Hydraulic tests, *741.

Tests of materials and equipment (Cont.):

- Bond testing, 25; Survey, *87; Comments on, 86.
 - Bus and car experimental run, Detroit, *855.
 - Car springs, Twin Cities, *325.
 - Car wiring tests, Interborough, *440.
 - Catenary material tests, Erie, Pa., 605, *810.
 - Circuit breakers, Water rheostat for, Boston [Harlock], *90.
 - Facel gas-electric bus makes trial run, 643.
 - Paint tests, Boston "L," *173.
 - Pinion tests, Worcester, Mass., *71.
 - Platform controller tests, Syracuse, N. Y., *609.
 - Pulverized coal, Providence, R. I. [Slade], *511.
 - Rail deflections under load, 238.
 - Repeated impact tests of rail joints, *252.
 - Testing drawbars on cars, *344.
 - Trackless trolleys, Two types, Detroit, *215.
- Texarkana, Ark.:
- Southwestern Gas & Electric Co.: Fares to be increased, 993.
- Texas Interurban Ry. (see Dallas, Tex.)
- Texas, State of:
- Shop report forms used on Stone & Webster properties, *434.
- Third Avenue Ry. (see New York City.)
- Tickets and tokens (see Fare collection).
- Ties:
- Cushion tie tried at Cleveland, *140.
 - Old rail used for, Bangor, *333.
 - Spacing cap, and shoe for jacks, *554.
 - Treated ties decrease maintenance costs [Findley], 894; Comments on, 875.
- Timetables (see Schedules).
- Tires:
- Maintenance practice, Los Angeles, *449.
- Toledo, O.:
- Board of Control asks for better railway service, 481.
 - Community Traction Co.: Customer ownership advantages, 923. Development plans for 1925, 75. Draft of railway-bus system to be presented, 550, 670.
 - Financial reports, 635, 832.
 - Improved railway service and fare reduction expected, 481.
 - Municipal operation discussed, 745, 785, 820.
 - Transportation system subject of political discussions, 425.
- Topeka, Kans.:
- Topeka Railway & Light Co.: Buses supplement street cars, 315.
- Toronto, Ont., Can.:
- Arbitration costs paid, 869.
 - Hydro-Electric Power Commission: Motorcycle reduces cost of freight pick-up, 204.
 - Toronto Transportation Commission: "In situ" rails, Results with, *1010. Lathe chuck for axle bearings, *344. Melting babbitt from old bearings, *380. Railway equipment used to remove snow, *144.
 - Systematic records reduce line failures [Neidl], *703.
 - Treadle door cars, Features of [McRae], 983.
- Tower wagons (see Service and tower trucks).
- Track construction:
- Cushion ties used at Cleveland, *140.
 - Derrail, Automatic, For steep grades, *1008.
 - Electric derrail protects bridge crossing, *225.
 - Equipment for, Pittsburgh, Pa., *971; Comments on, 957.
 - Factors in reducing cost of [Findley], 894; Comments on, 875.
 - Labor-saving equipment for [Meyers], 780.
 - Mechanical ties, Use of, Details [Howell], *190.
 - Modern equipment reduces cost, Birmingham, [Taurman], *537.
 - New York City, Rapid transit construction proposed, 517.
 - Old rail used for ties, Details, Bangor, *333.
 - Review of 1924, 367.
 - Review of 1924, Statistics, 17; Comments on, 3.
 - Telephone dispatching saves time of work cars, Boston, 144.
 - Tieless, Concrete track, Hot Springs, Ark., [Gauthier], *415.
 - Tim-spacing cap and shoe for jacks, *554.
 - Track expansion proposed in Los Angeles, Cal., *731.
- Trackless trolleys:
- Expansion in the far East, *694.
 - Orders, 1924 statistics, 7, 61; Comments on, 3.
 - Tests and results, Two types, Detroit, *215.

Track maintenance:

- Air compressor tools, Box for, *1021.
 - Anchorage for track bumpers, 232.
 - Concrete curb along rail reduces paving cost, *94.
 - Disconnecting switches, New type, 590.
 - Equipment for, Pittsburgh, Pa., *971; Comments on, 957.
 - Equipment mounted on Ford trucks, *155.
 - Factors in reducing costs [Findley], 894; Comments on, 875.
 - Hinged wood bar for double-throw switches, [McKelway], *380.
 - Inspection of track and roadway basis for prize award, Indianapolis, *461.
 - Labor-saving equipment for, [Meyers], 780.
 - Machinery for reconstruction work, *186.
 - Measuring rail deflections, Machine for, 258.
 - Methods used, Baltimore, *463.
 - Practices and suggestions for [Catherman], 510.
 - Precast concrete paving between tracks, *505.
 - Rail bonds, Testing, 25 railways, *87; Comments, 86.
 - Roadbed maintenance important, Comments on, 438.
 - Salt prevents freezing of track switches [Meyerherm], *881.
 - Special organization handles, Baltimore, *465.
 - Truss rail for rail joints, *344.
 - Weeds killed with poison, Equipment for, Los Angeles, *884.
 - Welding reduces cost of [Lincoln], *101.
 - Welding set, Engine-driven, *902.
- Traffic investigations:
- Atlanta, Ga., Beeler report, 55, *130, *181.
 - Australia, New Zealand, Tramways favored, 417.
 - Buffalo, N. Y., Traffic conference proposed, 480.
 - Cleveland, Ohio, Survey proposed, 470.
 - Colorado Springs, Colo., Engineers' report, *883.
 - Detroit, Mich., Survey, Methods, *129; Comments on, 127.
 - Detroit, United Ry., Survey, to be made, 900.
 - Los Angeles, Cal., Engineers' report, Details, 198, 705, *731.
 - New York City, Governor's findings, 253, 372; Comments on, 245, 246, 301.
 - North Jersey Transit Commission, *222; Comments on, 210.
 - Oakland, Cal., Engineers' report, 903.
 - Oklahoma City, Okla., 519; Comments on, 493.
 - Pittsburgh, Pa., 409; Comments on, 390.
 - Washington, D. C., Survey to be made, 700.
 - Westchester County, New York, *214; Comments on, 210.
- Traffic regulation:
- Centralized transit control essential, Comments on, 837.
 - Laws laxly enforced, St. Louis [Buck and Stocks], *397; Comments on, 395.
 - Pittsburgh, Pa., New rules aid railway operation, *847.
 - St. Louis prohibits downtown parking, 37, 949, 991.
 - Use of railway trucks by other vehicles, Comments on, 910.
- Traffic stimulation (see also Merchandising Transportation):
- Advertising increases passenger traffic [Blanchard], 985.
 - Atlanta, Ga., Plans for increased traffic, 311.
 - Business building methods discussed at C. E. R. A. meeting, 931.
 - Gasoline raise a trolley sales argument, *371; Comments on, 362.
 - Increasing speed of car loading at terminals [Williams], 101.
 - Intensive merchandising campaign, Coffeyville, Kans., 483.
 - Interurban consolidation, Effect on traffic [Beeler], 935; Comments on, 915; [Storrs], [Coates], [Henry], [Brady], *930.
 - One-man car operation, Newark, N. J., Speed increased, Details, *363.
 - Preparations for exceptional crowds, Comments on, 684.
 - Rehabilitation of City & South London Ry., *141.
 - Roofed loading platform accelerates traffic, Detroit [Peterson], *653.
 - Stop elimination speeds up service, Boston, *888.
 - Sunday pass increases riding, Beaver Valley, *880.
 - Timetable and map on bulletin board increase traffic, Boston, *2221.
- Traffic growth, New York City, 10 years, 378.

Transfers (see Fare collection).

- Coupon books extend privileges, Pittsburgh, *62.
 - Tea-off, New form transfer, Schenectady, *888.
- Transformers (see Power distribution).
- Transportation, Metropolitan:
- Atlanta transportation controlled by railway, 384.
 - Calculating profit and loss, Comments on, 570.
 - Census reports, Traffic statistics, 305; Comments on, 284.
 - Co-ordination proposed by Scottish Tramways Assn., 987.
 - Maximum service obtained by co-ordinating bus and trolley [Tripp], 206.
 - National city planning conference, 602; Comments on, 645.
 - Public utilities natural monopolies, Comments on, 683.
 - Should be run by transportation men, [Brush], 297.
 - Subway proposed in Pittsburgh, Pa., *400; Comments on, 396.
 - Traffic handling problem [Bartholomew], 818.
 - Train operation, Interborough, N. Y. C., Details, *917.
- Trenton, N. J.:
- Suggestions for improving trolley service, 313.
- Tri-City Railway of Iowa (see Davenport, Ia.)
- Tri-City Railway of Illinois. (See Rockford, Ill.)
- Trolley base, New type (O-B), *260.
- Trolley buses (see trackless trolleys).
- Trolley shoes and wheels:
- Discussed at Southwestern Convention, 770.
- Troy, N. Y.:
- Troy & New England Ry.: Annual report, 596.
- Trucks:
- Crane mounted on Mack chassis, Birmingham [Taurman], *337.
 - Grand Rapids sample cars, Details, 721, *807; Comments on, 719.
 - Modern design and developments [Adams], *925.
 - Overhauling practice, N. Y. C., *959; Comments on, 957.
 - Single-truck one-man car, Third Avenue Ry., Details, *877.
- Twin City Rapid Transit Co. (see Minneapolis, Minn.).

U

- Unemployment (see Employees and Labor).
- Union Street Ry. (see New Bedford, Mass.)
- Union Traction Company of Indiana (see Anderson, Ind.)
- United Electric Rys. (see Providence, R. I.)
- United Railways Company of St. Louis (see St. Louis, Mo.)
- United Railways & Electric Co. (see Baltimore, Md.)
- United States Chamber of Commerce (see Chamber of Commerce of United States)
- United Traction Co. (see Albany, N. Y.)
- Utah Light & Traction Co. (see Salt Lake City, Utah).
- Utica, N. Y.:
- New York State Rys. (see Rochester, N. Y.)
- Utility information bureaus (see Public, Relations with).

V

- Valuation (see Appraisal of railway property).
- Vancouver, B. C., Can.:
- British Columbia Electric Ry.: Car order, 282.
- Virginian Ry.:
- Economies expected from electrification, *843.
- Electric locomotive demonstrated, 795.
- New locomotive inspected, 169.
- Virginia Railway & Power Co. (see Richmond, Va.)
- Virginia, State of:
- State Commission controls rates of fare, 233.

W

- Wage decreases:
- Sioux City, Iowa, 904.
- Wage increases:
- Atlanta, Ga., 827.
- Aurora, Ill., 1030.
- Buffalo, N. Y., 237.
- Cleveland Ry., 785.

- Wage increases (Cont.):
 —Detroit, Mich., 785.
 —Scranton, Pa., 272.
 Wages and working agreements:
 —Boston, Wage controversy, 746.
 —Capital Traction Co., Washington, D. C., Controversy, 385.
 —Cleveland, Ohio, Wage controversy, 591, 630, 705, 743, 785; Comments on, 756.
 —Conspectus of indexes, 165, 356, 524, 635, 675, 832, 1032.
 —Detroit, Employees withdraw demand for increases, 107.
 —Illinois cities, Wage agreements, 863.
 —Memphis men renew wage scale, 631.
 —New Orleans, Wage increase asked, 744.
 —New York State Rys., Wage increase asked, 504.
 —Philadelphia, Basic wage plan, 744.
 —Rochester, N. Y., Wage contract renewal rejected, 744.
 —San Francisco, Increase refused, 271.
 —Springfield, Mass., Union rejects arbitration, 592.
 —Trend in 1924 [Richey], 15; Comments on, 3.
 Warehouse Point, Conn.:
 —Hartford & Springfield Street Ry.: Damage suit alleges illegal competition, 483.
 Reorganization plans, 43.
 Washington, Baltimore & Annapolis Electric Ry. (See Baltimore, Md.)
 Washington, D. C.:
 —Capital Traction Co.:
 Exhibitor at industrial exposition, 670.
 Handling traffic, Method and practice [Miller], *247.
 Length of service of officers and employees, 258.
 Measuring rail deflections, 258.
 Rail joint welding practice [Dalglish], 701.
 Value of property increased, 951.
 Wage increase asked, 385.
 —Traffic survey to be made, 706.
 —Washington Railway & Electric Co.:
 Annual report, 278.
 Rabbit melting pot, Electric, *269.
 Bus operation [Miller], *247.
 Handling traffic, Method and practice [Miller], *247.
 Measuring rail deflections, 258.
 Motor frames dipped and baked, *342.
 Wheel service, Statistics, 759.
 —Washington Rapid Transit Co.:
 Operating statistics, 736.
 —Washington-Virginia Railway:
 Operations to continue, 275.
 Reorganization or abandonment necessary, 236.
 Washington, State of:
 —Bus lines under I. C. C. jurisdiction, Comments on, 395.
 Waste in government, [Hoover], 820; Comments on, 875.
 Waterloo, Iowa:
 —Cedar Falls & Northern Ry.:
 Bus fares increased, 707.
 Watertown, N. Y.:
 —Black River Traction Co.:
 Line abandoned, 1020.
 Weekly pass (see Fares).
 Welding:
 —Arc:
 Automatic arc-welder, 626.
 Portable, motor-generator machine for, 196.
 —Bearings, Welding and boring reduces costs [An ex-Master Mechanic], c697.
 —Carbon arc, Chicago Surface Lines [Wolfel], 699.
 —Double-head, Reduces wheel maintenance, Detroit, [Colby], *463.
 —Oxyacetylene torch effects saving in Omaha, 330.
 —Practice on Boston "L" [Steward], 609.
 —Practice in Washington, D. C. [Dalglish], 701.
 —Rail joints, Bangor, Details, *333.
 —Rail joints, Methods, Eastern Massachusetts [Walker], 698.
 —Rail welding discussed, American Welding Society, 698.
 —Seam welding worn rail joints [Meyers], 780.
 —Table for light work, *230.
 —Thermit rail welding, Pittsburgh, Pa., *971; Comments on, 957.
 —Thermit, Track reconstruction, Birmingham, Ala. [Taurman], *537.
 —Track maintenance by welding [Lincoln], *101.
 —Track welding practice, Baltimore, *465.
 —Welded rail joints, A. E. R. E. A., committee report, 302.
 —Wheels, Denver maintenance practice, *327.
 —Worn wheel flanges built up by, 108.
 West Chester, Pa.:
 —West Chester Street Ry.:
 Benefit association organized, 991.
 Bus lines taken over, 123.
 West Virginia, State of:
 —Taxis enjoined from competing with railways, 801.
 Wheels and axles:
 —Designs used on modern car trucks [Adams], *925.
 —Hub odometer, New type, *422.
 —Inspection methods, Interborough, *440.
 —Special wheel shop, Dayton, *625.
 —Welder reduces maintenance, [Colby], *463.
 —Wheel service compared, 3 cities, 759.
 Willoughby, Ohio:
 —Cleveland, Painesville & Eastern R. R.:
 Annual report, 489.
 Wilmington, Del.:
 —Wilmington & Philadelphia Traction Co.:
 Subsidiary bus operation begun, 707.
 Wilmington, N. C.:
 —Tidewater Power Co.:
 Fares increased, 866.
 Winnipeg, Man., Can.:
 —City to negotiate for railway, 599.
 —Winnipeg Electric Co.:
 Stock sale to customers, 388, 560.
 Winona Interurban Ry. (see Warsaw, Ind.)
 Wisconsin Traction, Light, Heat & Power Co. (See Appleton, Wis.)
 Wisconsin Utilities Association:
 —Annual meeting, 660; Comments on, 645.
 Wood preservation:
 —Timber waste partially overcome by preservatives, 717.
 —Work outlined for ensuing year, 154.
 Worcester, Mass.:
 —Worcester Consolidated Street Ry.:
 Arbitration sought, 606.
 Bus plans outlined, 743.
 Fares reduced, 672.
 One-man cars sanctioned, 36.
 Pinion failure due to worn axle and housings, *71.
 Refunding plan, 164.
 Service to be restored on abandoned line, 607.
 Weekly pass to be tried, 275.
 Working agreements (see Wages and working agreements).
 Wrecks (see Accidents).

Y

- Yonkers, N. Y.:
 —Bus franchise granted, 707.
 York, Pa.:
 —York Rys.:
 Snow removal by railway would mean loss, [Wayne], c264.
 York Utilities Co. (See Sanford, Me.)
 Youngstown, Ohio:
 —Pennsylvania-Ohio Electric Co.:
 Freight terminal, New Details [Graham], 223.
 Zone check system on one-man interurban lines [Best], *143.
 —Youngstown Municipal Ry.:
 Annual report, 318.
 Weekly tickets tried, *556, 630, 866.

Z

- Zanesville, Ohio:
 —Columbus, Newark & Zanesville Electric Ry.:
 Map, Electrified, attracts shippers at convention, *929.
 Sold at auction, 319.
 Zone fare systems (see Fares).

Abbreviations: *Illustrated, c Communications.
 READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX

AUTHOR INDEX

A

Adams, Walter S.:
—Essential features of modern electric truck design, *925.

B

Barry, John G.:
—Manufacturer's contribution to the electric railway, 293.
Bartholomew, Harland:
—Metropolitan traffic problems, 818.
Beeler, John A.:
—A major operation on the interurbans, 935.
Berry, V. W.:
—The street car of 1930, 780.
Best, H. H.:
—Zone check system used on P.O. one-man interurban lines, *143.
Blanchard, Frank L.:
—Increasing passenger traffic by advertising, 985.
Bosenbury, J. M.:
—Results with light-weight interurban cars, 149.
Brady, Arthur W.:
—Comments on interurban consolidation, c930.
Brown, F. W.:
—Interurban freight traffic—its source and development, 147.
Brown, Harry L.:
—A new name for the American Association discussed, c416.
Brown, J. L.:
—Cabinet for workmen's tools and supplies, *942.
—Pneumatic mortising clamp, *974.
Brush, Matthew C.:
—Transportation men should run transportation systems, 297.
Buck, Morris:
—Transit conditions in St. Louis today, *397.
Bulle, F. G.:
—Future of the bus and the electric railway, 892.

C

Campbell, K. C.:
—Public utility storekeeping, 1018.
Catherman, J. I.:
—Track maintenance practices, 510.
Charters, H. J.:
—Portland signal failures decrease, *268.
Chase, Charles W.:
—Significance of subsidized bus competition, 899.
Clardy, W. J.:
—Light-weight interurban cars, 152.
Coates, Frank R.:
—Comments on interurban consolidation, c930.
Colby, A. C.:
—Double-head welder cuts wheel maintenance in Detroit, *463.
Cooke, B. P.:
—Steam line electrified to furnish interurban service, *647.
Gordon, Charles:
—Electric railways keep pace in rapidly growing Texas cities, *1009.
Curley, Hon. James M.:
—Results with public control, 548.

D

Dahl, T. R.:
—Relation between automotive and electric railway industries, 294.
Dalglish, R. H.:
—Welding in Washington, 700.
Dell, L. E.:
—Current-collecting devices, 779.
Dell, F. C. J.:
—Exhibit space application forms go out Monday, 837.

E

Esch, John J.:
—Transportation acts and the electric railways, 200.
Ex Master Mechanic:
—Welding and boring cost less than new bearings, c697.

F

Ferguson, H. F.:
—Track-squaring device, *420.
Findley, R. H.:
—Factors in track construction and maintenance costs, 891.

Fitzgerald, Thomas:
—Comment on St. Louis situation, c545.
—Getting the community with you, 980.
Foster, S. L.:
—Cheap concrete setting for poles, 472.

G

Gass, Howard:
—Weight equipment, 938.
Gauthier, G. J.:
—Tieless track laid in Hot Springs, Ark., *615.
Gennett, C. W., Jr.:
—More on inspections for special trackwork, c378.
Gordon, Charles:
—Style in car design, 936.
Graham, R. N.:
—P.O. builds new freight terminal, *224.
Greer, C. L.:
—Trolley arrangement on bascule bridge, *139.

H

Hamilton, G. E.:
—Opportunity and responsibility of the railway executive, 295.
Hawkins, C. L.:
—Railway makes concrete poles in St. Louis, *226.
Henry, Charles L.:
—Comments on interurban consolidation, c930.
Hodges, A. L.:
—Safety practices in Brooklyn, 896.
Holden, William W.:
—Use of buses in city service, 818.
Hoover, Herbert:
—Waste in Government, 820.
Hott, O. R.:
—Band saw expedites metal cutting, 107.
—Motorman's value worked in by machine, *156.
Howell, T. E.:
—Track reconstruction speeded up by using mechanical ties, *190.
Hurlock, H. T.:
—Modernizing car painting methods, *967.
—Water rheostat used for testing circuit breakers, *90.

J

Jackson, Walter:
—British steam railroads carry much local traffic in cities, 621.
—Comment on St. Louis situation, c545.
—The business of selling rides, 980.
Jennison, E. W.:
—Old rail used for ties in Bangor, *333.
Johnson, O. B.:
—Car cleaning methods of Boston Elevated, 897.

K

Kippenberger, George L.:
—The car builder's car, 937.

L

Langland, H. S.:
—Age-life method of valuation deals with averages, c697.
Lincoln, J. F.:
—Maintenance repairs by welding, *101.
Lucas, J. H.:
—Improved window guard for spray painting, *612.
—Upper deck inclosed for winter, *192.
Lynch, F. C.:
—Bead of solder indicates pole clearance, 231.

M

MacMurray, G. J.:
—Notes on the news of the year, 9.
Maoy, F. S.:
—Essentials of discipline, 148.
Mattinson, Henry:
—Comment on foreign report, c104.
Meriwether, Richard:
—Automatic doors relieve Jim Crow problem, *227.
Metcalf, J.:
—Car designs and their relation to operating conditions, 982.
Meyerherm, Charles F.:
—Stray earth currents increased by salt, *881.
Meyers, E. S.:
—Labor-saving equipment in trackwork, 780.
Miller, John A., Jr.:
—Transporting workers in Washington, *247.

Muir, Wallace:
—Preventing grade crossing and highway accidents, 111.

Mc

McGraw, James H.:
—The business paper of the future, 228.
McKelway, G. H.:
—Hinged stop for double-throw switches, *380.
McRae, W. R.:
—Features of Toronto treadle cars, 983.

N

Neal, R. S.:
—All motor repairs made at shop, 457.
Neild, J. F.:
—Systematic records reduce line failures, *763.
Noble, H. G.:
—Oils and pigments used in car painting, 939.

O

O'Connor, George M.:
—Uniform traffic laws proposed, 113.

P

Palmer, L. H.:
—New name proposed for A.E.R.A., c378.
—Park tax not in lieu of other taxes in Baltimore, c416.
Paul, Lesley C.:
—Calendar of meetings helpful, c621.
Pelletier, George E.:
—Hokyo contracts for power, *541.
Peterson, G. A.:
—Shelter combined with island platform, *653.
Plummer, George I.:
—Treadle car operation, 781.
Pontius, P. A.:
—Use of undersize and oversize armature and axle bearings, 618.
Porter, J. T.:
—Outdoor storage rack for bar stock, *943.

Q

Queney, J. A.:
—Philadelphia's reasons for gas-electric buses, 151.

R

Reid, Harry:
—Increasing confidence in electric railway future, 111.
Reiff, J. L.:
—Finishing bearing faces in small plater, *106.
Richey, Albert S.:
—Electric railway costs and fares in 1924, 15.
Rogers, J. L.:
—Air-operated bulldozer, *71.
Rollins, Frank X.:
—Dispatching methods for single-track interurban operation, c736.

S

Schram, Ross:
—Fair attitude commended, c880.
Scott, Charles B.:
—Safety as a means of reducing insurance costs, 508.
Scott, James:
—Special overhead during grade elimination, *880.
Seybold, C. R.:
—Control equipment mounted inside baggage cars, *580.
Shannah, J. N.:
—Serving the public better, 778.
—Broadening the American Electric Railway Association's work, 547.
Shaughnessy, T. H.:
—Maintenance of equipment in Chicago, 509.
Skellley, F. V.:
—Budgeting overhead line maintenance, 510.
Slade, W. C.:
—Operating improvements at Providence, 511.
Smith, C. E.:
—Financing rapid transit facilities, 495.
—Comment on the St. Louis street railway motor bus situation, c586.
Sniffin, E. H.:
—Superpower and the railways, 112.
St Clair, Lober:
—Dire penalties for bad advertising, 817.
Stein, Wilhelm:
—Financing rapid transit extensions in Hamburg, 655.
Steward, H. M.:
—Boston welding practice, 699.

Stocks, Carl W.:
—Transit conditions in St. Louis today, *397.
Storrs, Lucius S.:
—Bringing back prosperity to the electric railway lines, 933.
—Comments on interurban consolidation, c930.
—The electric railway an indispensable service, 783.

T

Taurman, A.:
—Track reconstruction cost reduced by use of modern equipment, *537.
Thirlwall, J. C.:
—Gas-electric drive for buses, 150.
Tongue, G. F.:
—Current-collecting devices, 770.
Tripp, Guy E.:
—Both buses and cars needed, 296.

W

Walker, D. H.:
—Interurban railway puts way maintenance on a competitive basis, *461.

Walker, Frank B.:
—Rail joint welding on Eastern Massachusetts, 698.
Warner, A. S.:
—Hints on coil storage, 166.
Way, S. B.:
—One railway's experience with buses, 291.
Wayne, J. E.:
—Snow removal in the smaller city, 264.
Weston, R. A.:
—Accounting for stores, 217.
Whitney, E. F.:
—Maintenance of armature bearings and housing fits, *451.
—Reborring 101-B motor frames for oversize housings, *761.
Williams, H. S.:
—Increasing the speed of car loading at terminals, *191.
—Reducing noise in car operation, *765.
—Silk screen sign painting used in Detroit, *291.
Williams, S. J.:
—Safety Council emphasizes need of sustained effort, c889.
Witt, Peter:
—The car rider's viewpoint, 289.
Willis, E. N.:
—Calendar of meetings helpful, c921.

Wolfe, Jonathon:
—Carbon arc welding on Chicago Surface Lines, 699.
Wood, T. E.:
—Die-formed pedestal wear plates, *429.
—Jig for cutting circular disks with torch, *382.
—Punch and die for forming journal box covers, *1920.
—Self-centering chuck for armature bearings, *470.
Woodbridge, J. E.:
—Developments in substation practice in San Francisco, *573.
Worlock, L. E.:
—Reducing motor failures at Syracuse by better maintenance, *757.
Wymer, J. J., M. D.:
—Treatment of burns, 581.
Wysor, W. W.:
—Railway builds concrete trolley poles in a modern plant, *691.

Y

Young, Owen D.:
—Tribute to Mr. Storrs, 286.

PERSONAL INDEX

(with biographical notes)

A

Allan, George W. *320
Allen, A. W. 641
Allen, Charles H. *40
Anderson, Clark G. 200
Andrews, Gen. Lincoln C. *527, 602
Ashfield, Lord. 242

B

Backerl, A. O. 752
Bagnall, E. J. 603
Baker, A. W. 392
Bardo, C. L. 1035
Barger, Milton S. 603
Barker, G. W. 280
Barnea, J. P. 107
Beattie, Aubrey 1035
Belden, David A. 793
Bell, H. P. 751
Bennett, Richard J. 433
Biekle, W. H. 704
Black, Charles N. 640
Black, F. M. 168
Blair, D. E. 320
Blake, Henry W. 40
Boire, C. H. 431
Bradley, L. C. 912
Brail, O. W. 490
Brannon, Sara E. 169
Braymer, Daniel H. 953
Brett, James A. 125
Briggs, Frank S. 435
Broadhead, Almet N. 752
Brooks, Charles A. *357
Brown, Harry L. *205
Brown, John P. W. *242
Buchanan, J. K. 81
Buck, Morris 40
Bullington, L. C. 243
Bump, Milan R. 704
Burley, V. W. 168
Burrill, Crawford 491

C

Campbell, R. B. *954
Carson, A. G. 569
Clifford, George H. 834, *912
Coates, F. R. 124
Coleman, Jilson J. 793
Collett, Bert. 187
Collins, J. C. 680
Colwell, Robert 281
Comfort, G. W. *640
Cornwell, Robert E. 491
Coutts, Mayor Fred. 603
Cowgill, H. A. 392
Crane, S. S. 679
Crawford, Norman McD. 205, 6911
Currie, Charles 235
Curtis, V. S. 603

D

Darling, Henry W. 47
Deitz, L. C. *167
Davis, Alfred S. 167
Dean, Dwight B. 243

Dean, Morton H. 610
Delano, Safford S. 125
Dieke, Henry F. *679
Dowdell, William E. 955
Dozier, Joseph E. 125
Duffy, M. J. 200

E

Egolf, J. F. *601
Elkins, A. F. 433
Ellis, Howard 603

F

Fahey, John J. 491
Fahey, John L. 506
Fallon, H. J. 357, 1031
Fell, A. L. C. 320
Fisk, I. W. *751
Fitz, E. S. 392
Flitzgerald, Thomas 47
Flickinger, W. J. *433

G

Gifford, C. W. 392
Gill, William A. 47
Goodenough, W. H. 392
Green, George R. *490
Gross, Edward W. 358
Guthrie, Charles R. 207
Guthrie, Ira E. 490

H

Halliday, J. O. 1035
Hamilton, John Bailhe. 207
Hannafor, R. M. 491
Harris, George H. 590
Hart, William S. *998
Hawkins, William C. 955
Hawley, Cornell S. *641
Hay, Thomas A. H. 912
Haylock, Frank Edward. 82
Haynes, Louis C. 912
Hedges, Job E. 358
Henderson, Fred E. 873
Henshaw, George A. 206
Herr, E. M. 81
Holden, W. W. *873
Hollar, L. E. 569
House, W. A. 206
Howe, Glenn G. 207
Hughes, Adrian, Jr. *670
Hutchins, S. D. 82
Hyatt, J. S. 1034

I

Ingle, J. P. 611

J

Jackson, Alexander *602
Jackson, W. P. *793
Johnson, H. A. 357
Johnson, J. Frank 568
Josselyn, B. S. 912

K

Kay, Charles Y. 435
Kelly, William C. 243
Kelly, William F. *1034
Kerr, John 794
Koehler, A. W. 704
Kruesi, August 794
Kuriz, C. L. *280

L

Lathrop, Rufus G. 1034
Lawyer, William M. 358
Lindsay, Alex. M. *492
Linos, William H. 873
Littig, H. E. 602
Lloyd, Harry H. 680
Lyman, Frank 752

M

MacLeod, George 490
Maggard, E. H. 641
Maize, F. P. 358
Maltby, George E. *1035
Maltby, George L. 1035
Marsh, Cyrus C. 47
Martin, Richard W. 951
Mathiason, Roy W. 124
Merrick, F. A. 81
Merrill, I. N. 954
Michele, J. D. 243
Miller, Frank H. 46
Miller, John A., Jr. 46
Morley, William K. 873
Murdoch, Charles M. 358
Murphy, John Z. *168
Murphy, Joseph P. 435
Murray, R. S. 47
Myers, W. H. 490

Mc

McDonald, R. B. 602
McIntyre, W. H. 392
McKay, George F. 528
McPherson, Logan G. 528
McWethy, H. E. 243

N

Nanton, Sir Augustus. 717
Newton, Henry S. 601

P

Pellissier, Louis D. *595
Perrine, Col. Lewis 752
Peters, Ralph 794
Phillips, F. R. *528
Preston, Homer M. 1035
Prince, Arthur D. 169
Procter, Carroll L. *834
Pundeford, J. K. *433

R

Reichart, H. L. 680
Rice, N. M. 1035

S

Riddle, Samuel 46
Ridgway, Robert 206
Robert, E. A. *751
Robertson, H. S. *998
Rogers, Hollis B. 794
Root, Fred N. 717
Ross, David W. 955
Russell, W. T. *528
Rushmore, David B. 242
Russell, Charles A. 831

T

Terrell, Charles F. 491
Thompson, Charles E. *1034
Thompson, W. E. 124
Thornton, Kenneth B. 320
Torrey, L. C. 1034
Tschoner, William 990
Triay, Eduardo J. 680
Turner, John H. 794

U

Underwood, F. V. *1035

V

Valentine, A. L. 602
Van Brunt, J. H. 603
Vargas, Chester C. *680
Vaughan, Sidney L. 873

W

Wallace, Col. H. U. *953
Wallis, Robert N. 281
Ward, Artemas 491
Weeks, H. E. 802
Wells, George W. 320
Wenckel, George F. 679
West, E. A. *679, 718
Wheeler, W. B. 206
Williams, Oscar *528
Wood, W. E. *834
Woodlock, Thomas F. 243
Woodman, Franklin 435
Wyatt, R. H. 46

Y

Yates, Winchell G. 81
Yungbluth, B. J. 280

ELECTRIC RAILWAY JOURNAL

McGraw-Hill Company, Inc.

January 3, 1925

Twenty Cents Per Copy



Another reel in the story of Phono-Electric

The mills of the Bridgeport Brass Company, home of Phono-Electric Trolley Contact Wire, are today producing a new product,—Phono-Hi-Strength wire. This wire has the weather-permanence and the same coefficient of expansion as copper but *twice its tensile strength*. It is a highly desirable messenger wire for catenary construction and is being so used entirely on the new electrification of the Virginian Railway.

“Bridgeport”
TRADE CO. MARK
Phono-Electric

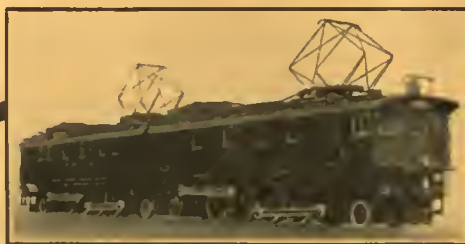
Costs more per mile but less per year.

Bridgeport Brass Company
Bridgeport Connecticut

Phono-Hi-Strength

Contributions to Electrification

During 1924



Norfolk & Western Railway.

The Norfolk & Western Railway extended its electrified zone 20 miles during 1924, and placed orders for a further extension of 48 route miles. Four new 414-ton, 4750 hp., 11,000 volts, A-C. Locomotives, consisting of two motive-power units, are now being placed in service.



Pennsylvania Railroad

204.3-ton, 3300 hp., 11,000 volt, A-C. Locomotive. The Pennsylvania Railroad has placed in service three new electric locomotives. Two of these are operating in passenger service on the New York Division, and the third in freight service on the Philadelphia electrified zone.



New York, New Haven & Hartford R. R.

179-ton, 2508 hp., A-C. Passenger Locomotive. To maintain 100% electric service, between New York and New Haven, the N. Y., N. H. & H. R. R. received during 1924 twelve high-speed passenger locomotives. Further extensions to their electrified zone are under way.



Long Island Railroad

54.5-ton, 430 hp., Multiple-Unit Cars. In order to more efficiently handle New York's heavy suburban traffic, The Long Island R. R. is extending its electrification to Babylon, L. I., a distance of approximately twenty miles. Forty additional multiple-unit equipments are on order.



Virginian Railway

The thirty-six, 200-ton, Alternating-Current Motive-Power Units, for operation over the 213 route miles of the Virginian Railways Electrification, are nearing completion. Electric operation will be inaugurated during the coming year.



Detroit & Ironton Railroad

340-ton, 4200 hp., 22,000-volt, Alternating-Current Locomotive. The Motor-Generator Locomotives, a new development in electric-motive power, now under construction at the Ford Motor Company's plant for the Detroit & Ironton Electrification, are expected to be placed in operation the early part of this year.

Westinghouse Electric & Manufacturing Company,
East Pittsburgh, Pennsylvania
Sales Offices in All Principal Cities of the
United States and Foreign Countries.

Westinghouse

MORRIS BUCK
Managing Editor
JOHN A. MILLER, Jr.
Associate Editor
C. W. SQUIER
Associate Editor
O. J. MacMURRAY
News Editor

ELECTRIC RAILWAY JOURNAL

HARRY L. BROWN, *Editor*

HENRY W. BLAKM
Senior Editor
CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
MERRILL B. KNOX
Editorial Assistant
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

CONTENTS

JANUARY 3, 1925

Editorials	1
\$342,000,000 of Purchases Planned for 1925.....	4
Largest expenditures in many years in prospect by electric rail- ways of U. S. this year. JOURNAL's estimate of industry budget for new year shows 30 per cent increase over purchases of 1924.	
Bus Operation by Electric Railways Doubles During 1924. 5	
The number of railway companies furnishing bus service has increased from 121 to 156 and many others have extended the scope of their operations.	
Notes on the News of the Year.....	9
By G. J. MacMURRAY. An attempt to touch upon some of the high spots of the year's work. Many of the important events of 1924 originally reported to the extent of 2,000 pages pressed now into five.	
Heavy Traction Has Quiet Year.....	14
Electric Railway Costs and Fares in 1924.....	15
By ALBERT S. RICHEY. Trend figures indicate a closer approach to stabilization. Recession in construction and operating costs. Wages and fares advanced.	
Track Extensions in 1924 Show Big Increase Over 1923..	17
New electric railway mileage added during the past twelve months is greater than for many years. Totals of both city and inter- urban extensions are larger.	
Car Orders Exceed High Level of 1923.....	21
Number of passenger cars ordered for interurban service highest since 1913. Fewer passenger cars ordered for city service.	
More Financing on Better Terms.....	26
Many new issues placed with investing public last year. Sales not difficult to make. Equipment trusts on increase.	
\$117,000,000 Less Involved in Roads Now in Receiverships..	31
Financial affairs of 18 companies straightened out during the year. Twelve companies thrown into receiverships. Mileage operated by receivers is decreased 338 miles from that at end of 1923.	
News of the Industry.....	35

McGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York

JAMES H. MCGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MCIR, Vice-President
E. J. MARRSEN, Vice-President
MASON HAYTON, Vice-President
JAMES H. MCGRAW, Jr., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary

WASHINGTON:
Colorado Building
CHICAGO:
Old Colony Building
PHILADELPHIA:
Real Estate Trust Building
CLEVELAND:
Leader-News Building
ST. LOUIS:
Star Building
SAN FRANCISCO:
883 Mission Street

LONDON:
6 Beaufort Street, London, E. C. 4
Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations

The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries \$3 (total \$7 or \$9 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.

Changes of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place. Copyright, 1925, by McGraw-Hill Company, Inc. Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.



Cable Address: "Machinist, N. Y."
Publishers of
Engineering News-Record
American Machinist
Power
Chemical and Metallurgical Engineering
Cool Age
Engineering and Mining Journal-Press
Ingeniería Internacional
Bus Transportation
Electric Railway Journal
Electrical World
Electrical Merchandising
Radio Retelling
Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
American Machinist—European Edition
(Published in London)

Improved Statistical Service

THE JOURNAL has long made a feature of the Annual Statistical Number, published the first Saturday in January each year. Begun in 1909, the material collected in this issue originally was confined to the collection of data on cars purchased, track built, and receiverships begun and terminated. Ten years ago this information was all covered in six pages of text and tables. Today the information of this character included in the issue covers 34 pages.

Each year the statistical information has been enlarged and new studies added as conditions dictated. The tables have become more complete, and more care has been taken to insure accuracy and to obtain last-minute information. All tables in this issue are corrected up to Dec. 31, 1924, with all replies received prior to going to press Friday night.

The information on buses purchased and operated by electric railways and their subsidiary companies is more extensive than that included last year, which was the first time such figures were collected by this paper. Tables show the number owned by each company and the types of all buses ordered during the year.

The other tables, covering the buying power of the industry, new financing, cars, track, receiverships, are continued in much the same form as in previous years. They show the progress of the industry, as reflected in a material way. The information is obtained from a series of surveys in which data are secured from all over the country. No information is included, however, unless it comes from authoritative sources, such as responsible officials of railways or holding companies.

Contributions to Electrification

During 1924



Norfolk & Western Railway.

The Norfolk & Western Railway extended its electrified zone 20 miles during 1924, and placed orders for a further extension of 48 route miles. Four new 414-ton, 4750 hp., 11,000 volts, A-C. Locomotives, consisting of two motive-power units, are now being placed in service.



Pennsylvania Railroad

204.3-ton, 3300 hp., 11,000 volt, A-C. Locomotive. The Pennsylvania Railroad has placed in service three new electric locomotives. Two of these are operating in passenger service on the New York Division, and the third in freight service on the Philadelphia electrified zone.



New York, New Haven & Hartford R. R.

179-ton, 2508 hp., A-C. Passenger Locomotive. To maintain 100% electric service, between New York and New Haven, the N. Y., N. H. & H. R. R. received during 1924 twelve high-speed passenger locomotives. Further extensions to their electrified zone are under way.



Long Island Railroad

54.5-ton, 430 hp., Multiple-Unit Cars. In order to more efficiently handle New York's heavy suburban traffic, The Long Island R. R. is extending its electrification to Babylon, L. I., a distance of approximately twenty miles. Forty additional multiple-unit equipments are on order.



Virginian Railway

The thirty-six, 200-ton, Alternating-Current Motive-Power Units, for operation over the 213 route miles of the Virginian Railways Electrification, are nearing completion. Electric operation will be inaugurated during the coming year.



Detroit & Ironton Railroad

340-ton, 4200 hp., 22,000-volt, Alternating-Current Locomotive. The Motor-Generator Locomotives, a new development in electric-motive power, now under construction at the Ford Motor Company's plant for the Detroit & Ironton Electrification, are expected to be placed in operation the early part of this year.

Westinghouse Electric & Manufacturing Company,
East Pittsburgh, Pennsylvania
Sales Offices in All Principal Cities of the
United States and Foreign Countries.

Westinghouse

MORRIS BUCK
Managing Editor

JOHN A. MILLER, Jr.
Associate Editor

C. W. SQUIER
Associate Editor

G. J. MacMURRAY
News Editor

ELECTRIC RAILWAY
JOURNAL

HARRY L. BROWN, Editor

HENRY W. BLAKK
Senior Editor

CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago

MERRILL R. KNOX
Editorial Assistant
Old Colony Bldg., Chicago

CARL W. STOCKS
Associate Editor

CONTENTS

JANUARY 3, 1925

Editorials	1
\$342,000,000 of Purchases Planned for 1925.....	4
Largest expenditures in many years in prospect by electric rail- ways of U. S. this year. JOURNAL's estimate of industry budget for new year shows 30 per cent increase over purchases of 1924.	
Bus Operation by Electric Railways Doubles During 1924. 5	
The number of railway companies furnishing bus service has increased from 121 to 156 and many others have extended the scope of their operations.	
Notes on the News of the Year.....	9
By G. J. MacMURRAY. An attempt to touch upon some of the high spots of the year's work. Many of the important events of 1924 originally reported to the extent of 2,000 pages pressed now into five.	
Heavy Traction Has Quiet Year.....	14
Electric Railway Costs and Fares in 1924.....	15
By ALBERT S. RICHEY. Trend figures indicate a closer approach to stabilization. Recession in construction and operating costs. Wages and fares advanced.	
Track Extensions in 1924 Show Big Increase Over 1923..	17
New electric railway mileage added during the past twelve months is greater than for many years. Totals of both city and inter- urban extensions are larger.	
Car Orders Exceed High Level of 1923.....	21
Number of passenger cars ordered for interurban service highest since 1913. Fewer passenger cars ordered for city service.	
More Financing on Better Terms.....	26
Many new issues placed with investing public last year. Sales not difficult to make. Equipment trusts on increase.	
\$117,000,000 Less Involved in Roads Now in Receiverships..	31
Financial affairs of 18 companies straightened out during the year. Twelve companies thrown into receiverships. Mileage operated by receivers is decreased 338 miles from that at end of 1923.	
News of the Industry.....	35

McGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York

JAMES H. McGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MCIL, Vice-President
E. J. MERRIN, Vice-President
MAISON HUTTON, Vice-President
JAMES H. McGRAW, Jr., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary

WASHINGTON:
Colorado Building
CHICAGO:
Old Colony Building
PHILADELPHIA:
Real Estate Trust Building
CLEVELAND:
Leader-News Building
ST. LOUIS:
Star Building
SAN FRANCISCO:
533 Mission Street



Cable Address: "Machinist, N. Y."
Publishers of
Engineering News-Record
American Machinist
Power
Chemical and Metallurgical Engineering
Coal Age
Engineering and Mining Journal-Press
Ingeniero Internacional
Bus Transportation
Electric Railway Journal
Electrical World
Electrical Merchandising
Radio Retailing
Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
American Machinist—European Edition
(Published in London)

LONDON:
4 Bouverie Street, London, E. C. 4
Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations

The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries \$3 (total \$7 or \$8 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 25 cents.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place. Copyright, 1925, by McGraw-Hill Company, Inc.
Published weekly. Entered as second-class matter, June 23, 1900, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

Improved Statistical
Service

THE JOURNAL has long made a feature of the Annual Statistical Number, published the first Saturday in January each year. Begun in 1909, the material collected in this issue originally was confined to the collection of data on cars purchased, track built, and receiverships begun and terminated. Ten years ago this information was all covered in six pages of text and tables. Today the information of this character included in the issue covers 34 pages.

Each year the statistical information has been enlarged and new studies added as conditions dictated. The tables have become more complete, and more care has been taken to insure accuracy and to obtain last-minute information. All tables in this issue are corrected up to Dec. 31, 1924, with all replies received prior to going to press Friday night.

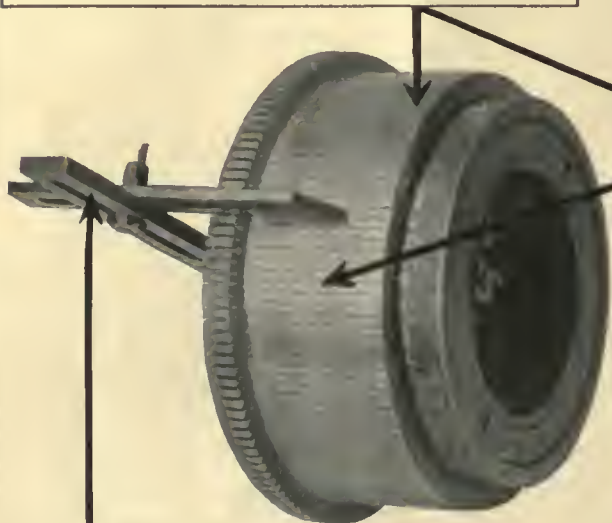
The information on buses purchased and operated by electric railways and their subsidiary companies is more extensive than that included last year, which was the first time such figures were collected by this paper. Tables show the number owned by each company and the types of all buses ordered during the year.

The other tables, covering the buying power of the industry, new financing, cars, track, receiverships, are continued in much the same form as in previous years. They show the progress of the industry, as reflected in a material way. The information is obtained from a series of surveys in which data are secured from all over the country. No information is included, however, unless it comes from authoritative sources, such as responsible officials of railways or holding companies.

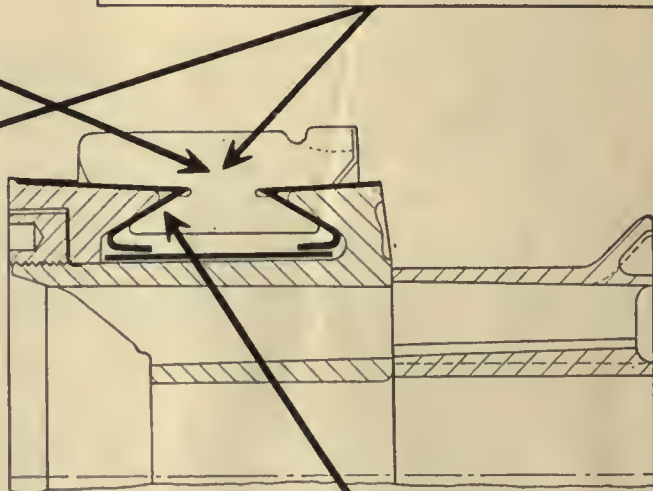
Westinghouse Commutators Stand Up In Service

Copper Segments are accurately gauged, chemically cleaned and burrs removed.

Mica Segments are made from mica free from impurities, built up under heavy pressure, and machined to uniform, gauged thickness.



Gauged. Every Westinghouse Commutator is checked up by a master gauge to assure accuracy.



Metal and Mica "V" Rings. The "V's" of the copper and mica segments are carefully and accurately machined, gauged and shellacked to secure a tight fit on the metal and mica "V" rings.

MATERIALS. Commutator life depends on the materials used in the process of manufacture. Because of its greater strength to withstand excessive strains, only hard-drawn copper is used for segments. As a precaution against break-downs, all mica is selected and graded for its purity and structure.

CONSTRUCTION. The "V's" of the built-up segments are machined to the proper size. This enables the maintaining of extremely small tolerances, and is a big advantage for correct assembly.

UNIFORM QUALITY. Uniform quality means longer life, better commutation and reduced arcing and flash-over troubles. The Westinghouse Company has developed efficient tools for the purpose of obtaining the greatest accuracy in manufacture.

INSPECTION. A systematic inspection during the various stages of manufacture prevents all small defects, and is a constant check on the correct workmanship. The final inspection checks up on all dimensions, and on the finish of the commutator.

All completed commutators are tested at 500 volts, A-C. for short circuits between bars, and at 4000 volts, A-C. for grounds.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pennsylvania
Sales Offices in All Principal Cities of the
United States and Foreign Countries.



Westinghouse

Modernizing and Merchandizing

With Westinghouse Modernized Equipment



In Cleveland



In Brooklyn



In Pittsburgh



In Wheeling



In Baltimore



In Los Angeles



In Los Angeles



In Houston



In Presque Isle, Me.



In Boston



In Springfield, Vt.



In New Orleans

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the
United States and Foreign Countries.

Designed For a Service

The tendency of the times is to modernize with equipment designed for a specific service. Heavy urban mass transportation, moderate city transportation, high speed interurban transportation and freight haulage all require characteristics which must be *built in the equipment*.

Westinghouse Engineers have made a study of the requirements of various types of service and are prepared to furnish *equipment for every transportation need*.



Westinghouse

X 78701

Section Insulators

Two Types: HR and HR-2.

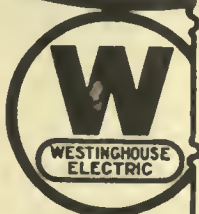
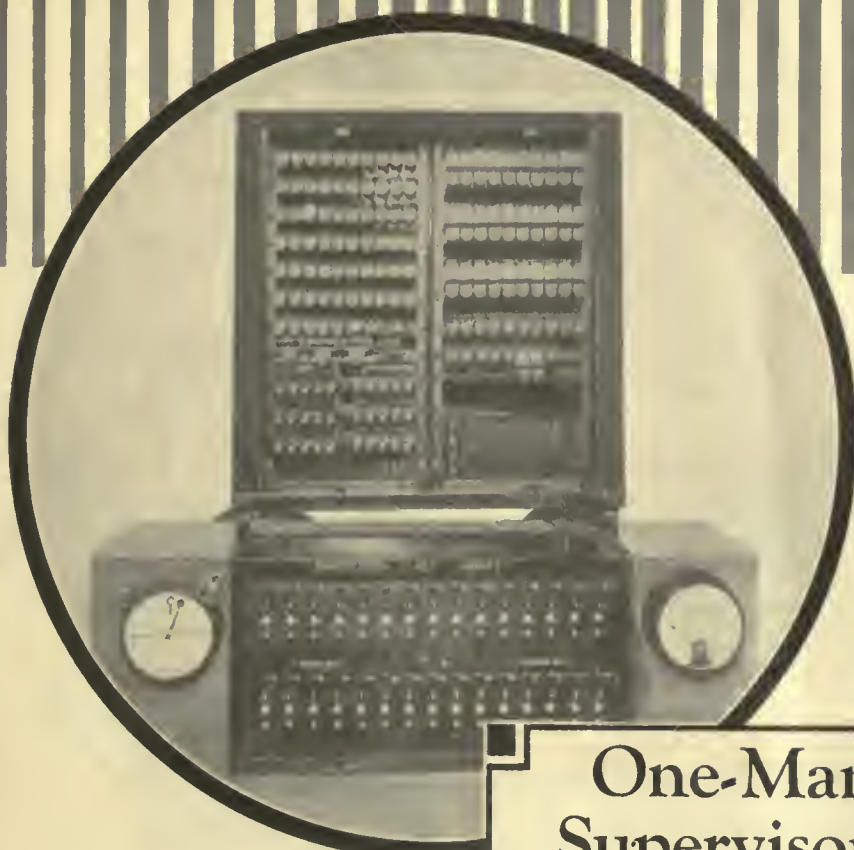
HR-2 has approaches fastened with carriage bolts.

It is provided with wedges which hold the wire in place.

HR has stove bolts but no wedges. All parts are renewable.



Westinghouse



One-Man Supervisory Control

WITH Westinghouse Supervisory Control, the control of one or more substations is centered in one place and is operated by one man, only. In this way, it is possible to place the responsibility for proper operation in the hands of your most reliable man, saving the expense of keeping an operator in each substation.

Write for Circular 1694-A for complete information about this equipment.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries

Westinghouse

Testing Insulation

Don't Guess
When You Can Be Sure



NO amount of visual inspection will tell whether or not an insulating job is perfect. A voltage test on electrical equipment, like the pressure test on a steam boiler, instantly reveals the slightest leak, and exposes the hidden weakness.

Westinghouse offers the electric railway company practical apparatus with which to impose high-voltage tests on electric-motor parts, controllers and all other electrical equipment where insulating materials are used.



Portable Bench Type, ½ kv-a., 2000 Volts

Widely used for testing field and armature coils before assembly, and for proving insulation, between commutator bars. Also in controller repair work, assembling grids, etc.

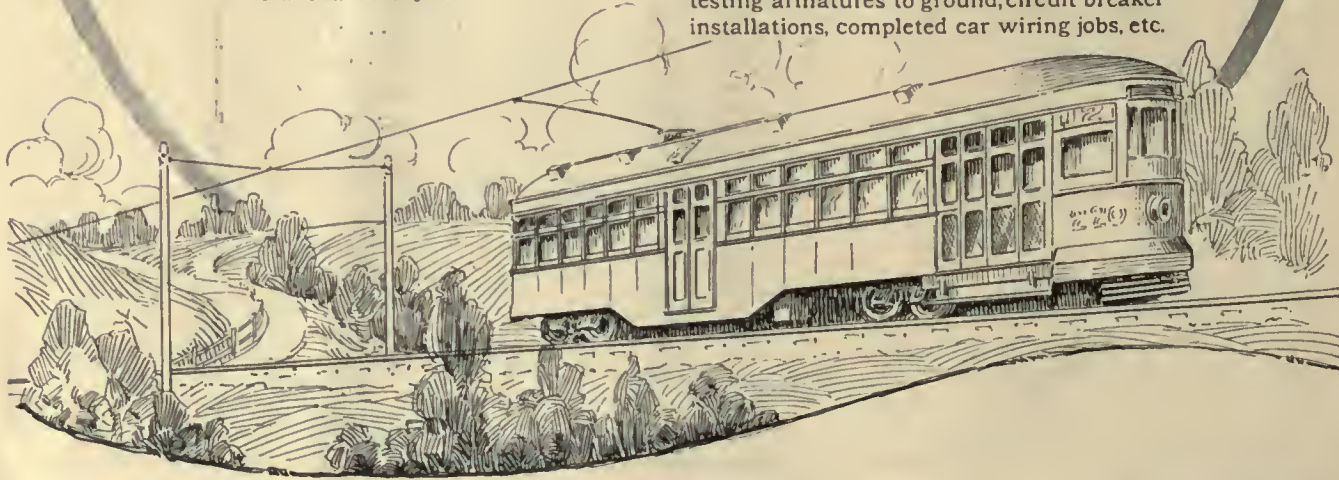
See Westinghouse Catalogue of Electrical Supplies, pages 656 and 657, or send for Leaflet 20010.



Portable Carriage Type, 5kv-a., 10,000 Volts

A more powerful testing set for trying out completely assembled parts, as for instance, testing armatures to ground, circuit breaker installations, completed car wiring jobs, etc.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in all principal cities of the
United States and Foreign Countries



Westinghouse

In the rush hours

THE maintenance of railway schedules is all-important. Substation equipment must meet the demand.

The Westinghouse two-unit automatic substation is a double assurance of uninterrupted power supply. The two machines, operating in parallel on the direct current bus, are so arranged that, in case of overload on one, the other starts immediately and assumes its share of the load. A sufficient supply of power to the trolley during peak periods is assured.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries



Westinghouse

More Sta- tis- tics:

During 1924 the Coffin Medal was won by a road that attributes part of its success to effective rail welding and track grinding with equipment shown here.

The most successful roads everywhere relied on this equipment.

The "Ajax" Arc Welder definitely maintained its superiority.

The "Vulcan" Rail Grinder made its appearance.

The "Imperia" Track Grinder was introduced.

The "Reciprocating" Grinder added new laurels for removing corrugations.

The "Midget" Rail Grinder joined our family.

The Railway Track-work line became broad enough to cover every track grinding and welding requirement.

Railway Trackwork Co.

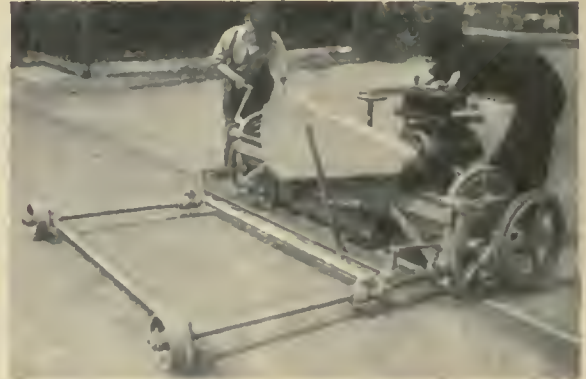
3132-48 East Thompson Street, Philadelphia

AGENTS:

Chester F. Gallor, 30 Church St., New York
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London



"Reciprocating" Track Grinder



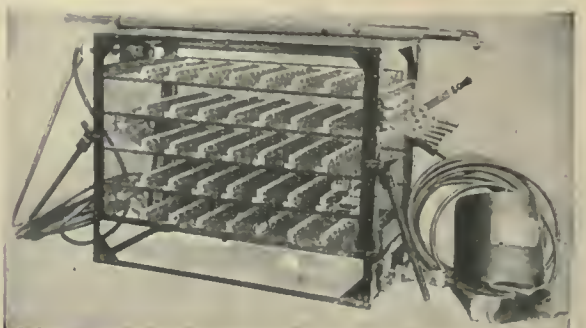
"Vulcan" Rail Joint Grinder



"Atlas" Rail Grinder



"Midget" Swing Frame Rail Grinder



"Ajax" Electric Arc Welder

Imperial Headlights



Luminous Arc for Interurbans

Type LAA

Incandescent for Interurbans

Type DCP




These two Imperial Headlights offer the maximum in track illumination — one from the luminous arc, the other from the incandescent bulb. For high speed interurban service they are ideal.

The Ohio Brass Co.
Mansfield, Ohio

B
PRODUCTS

The Spotlight of *facts on*



STEEL TIES

Costs Steel Twin Ties cost about one dollar per track foot at Cleveland. Cost of the track complete varies between \$6.00 and \$8.00 per track foot depending on local costs.

Service The renewal of rail on five miles of heavy-traffic street demonstrates the ability of a Steel Tie Foundation to outlast the rail and still serve to carry a renewal rail.

Users Installations have been made on over one hundred and fifty properties in the United States, Canada, Cuba and Europe.

Record The street railway companies that started using Steel Twin Tie Track twelve years ago are our best customers today.

You should find out why by writing now to

The INTERNATIONAL STEEL TIE COMPANY
CLEVELAND

Steel Twin Tie Track

Renewable Track . . . Permanent Foundation



The INTERNATIONAL STEEL TIE COMPANY
CLEVELAND

Steel Twin Tie Track

Renewable Track . . Permanent Foundation



HUNTER-KEYSTONE SIGNS

Inform the stranger, and remind the regular rider. Attract passengers to your cars by the big, clear, definite wordings, which advertise the routes, the destinations and the service.



FARADAY SIGNALS



KEYSTONE COMPENSATING FIXTURES



Golden Glow Headlights

Another Keystone specialty which is an advertisement of superior service. The characteristic soft yellow beam of the Golden Glow cuts a brilliant path of light through the night, but never glows or dazzles any who face it.

*Some
Good
Drawing
Cards!*

*During the New Year-1925
carry out those
modernization
ideas with-----*

KEYSTONE CAR EQUIPMENT!

A few other choice ones from the
NO. 7
KEYSTONE CAR EQUIPMENT
CATALOG

Steel Gear Cases
Motormen's Seats
Lighting Fixtures
Headlight Resistances
Air Sanders
Trolley Catchers
Shelby Trolley Poles
Rotary Gongs
International Fare Registers
Fare Register Fittings
Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors
Automatic Door Signals
Standard Trolley Harps
Standard Trolley Wheels
Segur Coil Winding Tools
Peerless Armature Machines
Insulating Materials
Cass Commutator Stones
Sand Driers
Peerless Pinion Pullers
Employees' Badges
Line Material
Portable Lamp Guards
Bus Lighting Fixtures



ELECTRIC SERVICE SUPPLIES Co.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
829 Oliver Building

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver

NEW YORK
50 Church St.

SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.
BOSTON
88 Broad St.

"SERVICE TO THOSE WHO IN TURN RENDER SERVICE TO THE PEOPLE."—*Rosentree*



Looking forward we foresee a long continuation of this service—a service that not only assures safety but saves labor, time and money in handling traffic. We further see continuous improvement—one link leading to another in the chain of NP development—a service ever broadening in its usefulness and keeping, not abreast, but a step ahead of future traffic handling requirements.

NATIONAL PNEUMATIC COMPANY

General Works
Rahway, New Jersey

Executive Office
50 Church Street, New York

CHICAGO
McCormick Building

CANADA
Toronto, 133 Eastern Avenue

PHILADELPHIA
Colonial Trust Building

"SERVICE TO THOSE WHO IN TURN RENDER SERVICE TO THE PEOPLE."—*Roxtree*



Looking backward we find an ever-spreading network of roads equipped with NP Door and Step Controlling Mechanisms. Their use has spread throughout the world and *continues* spreading—surest evidence that a want has been filled, that a way has been found, and that a service to the railways, honest in its purpose and its product, is appreciated on all properties which have been pneummatized.

NATIONAL PNEUMATIC COMPANY

General Works
Rahway, New Jersey

Executive Office
50 Church Street, New York

CHICAGO
McCormick Building

CANADA
Toronto, 133 Eastern Avenue

PHILADELPHIA
Colonial Trust Building

GREETINGS!



STANDING at the threshold of another new year, we, the members of the Air Brake Family, extend to the Electric Railway Industry our sincere wishes for a full measure of success during the coming year.

The same co-operation we have always tried to render in the solution of transportation problems will continue to be unstintingly given during

“Home of The Air Brake” - 1925 -



WESTINGHOUSE TRACTION BRAKE CO.

Say—

**“To be manufactured by—
The Consolidated Car Fender Company”**

when ordering

H-B LIFE GUARDS

then you will be assured of getting a **DEPENDABLE
LIFE SAVING DEVICE** because it is made

Up to a standard—not down to a price

Our H-B Life Guard proved its efficiency and superiority in the most exhaustive and severe tests by the Public Service Commission of New York which caused it to be adopted by most of the street railway systems in the United States.

**Reduce your maintenance costs and
damage claims by using THE REAL
THING — NOT AN IMITATION**

H-B LIFE GUARDS—PROVIDENCE FENDERS

Manufactured by

The Consolidated Car Fender Company

Providence, R. I.

Wendell & MacDuffie Co., General Sales Agents

110 East 42nd St., New York City

Reprinted from Electric Railway Journal, March 25, 1922

2491 METERS AT PHILADELPHIA

ALL STREET CARS WILL BE EQUIPPED

MY METER

DENVER BUYS

Ma Economy
complete with
Power Saving
Car Inspection

LOUISVILLE

Buy Economy Meters
complete with
Power Saving and
Inspection Dials

20,000 CARS

Reprinted from Electric Railway Journal, October 7, 1922

"United Railways of St. Louis" Buys 1442 Economy Meters

With Car
Inspection

SAN DIEGO

Buy Economy Meter
Car-Inspection

OMAHA

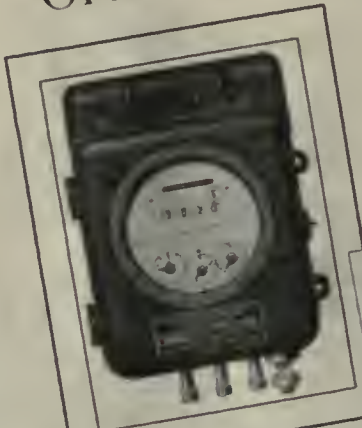
installs
ECONOMY
METERS

with
Inspection Dials

"Chicago Surface Lines" Buys 3000 Economy Meters

Public Service Railway Company Orders 1720 ECONOMY Meters

With Car
Inspection Dials



To Save Power At The Car
To Save Labor At The Car House

How It Inspects

Each car is equipped with an Economy Meter which inspects the car's electrical system. The meter is connected to the car's electrical system and will automatically shut off the car's power if it detects a fault. This prevents the car from operating with a faulty electrical system, which could be dangerous. The meter also provides a record of the car's electrical system's performance, which can be used to identify and correct problems before they become serious.

Every active passenger motor car operated by the Public Service Railway Company in the State of New Jersey will be equipped with an ECONOMY Meter with power saving and car inspection dials. This notable purchase follows a thorough investigation of power saving devices.

Energy input is the correct measure of the relative efficiency of different cars operating under similar conditions. The manufacturer has faith in a motor because with it he can prove that good operation gives him a good record of actual energy consumption and power requirements a year round. This power saving device actually tells the manufacturer and the customer whether power is being wasted or saved, and how much.

That, in brief, is the underlying reason for the success of the ECONOMY Meter. The ECONOMY Meter provides a method that accurately and automatically shows when car inspection is needed. It also shows at a glance how much more work a car can do before inspection is needed, or, in case of a road failure, how much work the car

has done previous to the failure of the car without any electrical labor.

The ECONOMY Meter is a rugged device which requires remarkably little maintenance. Its principal element is a glass-enclosed but central station and general metering for the power used. It is a standardized product built in a standardized plant, and its cost is maintained at a low level of cost averaging less than \$2.00 per year per meter.

More than one hundred street car interurban railways are complete with the ECONOMY Meter and are saving more than a third of the capital charges plus operating expenses of the meters in the first year.

The records from the ECONOMY Meters are of high value for operational and engineering purposes.

Economy Electric Devices Company
1 F. Gould, Pres., 114 Colony Bldg., Chicago

That's What You Want To Save

Meter The Energy—

A Partial List of Standardizers

Buffalo & Lake Erie Traction Co.
Chicago Surface Lines
Chicago, North Shore & Milwaukee R. R. Co.
Cincinnati, Newport & Covington R. R.
Cincinnati Traction Co.
Denver Traction Co.
Detroit Municipal Ry.

ECONOMY METERS

With car inspection dials

EQUIPPED IN THE U. S. A.

Eastern Mass. Str. Ry. Co.
Grand Rapids Ry. Co.
Key System Transit Co.
Illinois Traction System
Louisville Ry. Co.
Milwaukee Elec. Ry. & Light Co.
Omaha & Council Bluffs St. Ry.
Philadelphia Rapid Transit Co.
Public Service Railway Co.
Rockford & Interurban Ry. Co.
San Antonio Public Service Co.
San Diego Elec. Ry. Co.
Seattle Municipal Ry.
Tri City Railway & Light Co.
Union Street Railway Co.
Union Traction Co. of Ind.
United Railways of St. Louis
United Traction Co. of Albany
West Penn Rys. Co.
Atlantic City & Shore R. R.
Bloomington & Normal Ry. & Light Co.
Cedar Rapids & Marion City Ry.
Chicago & Joliet Elec. Ry.
Chicago & West Towns Ry.
Citizens Traction Co.
Clinton, Davenport & Muscatine Ry.
Danville St. Ry. & Elec. Co.
Dubuque Elec. Co.
Dayton, Springfield & Xenia Ry.
East Penn Electric Co.
East St. Louis & Suburban Ry. Co.
Eastern Texas Elec. Co.
El Paso Electric Ry. Co.
Galveston Electric Co.
Holyoke Street Railway Co.
Houston Electric Co.
Illinois Light & Power Co.
Indiana Service Corp.
Indianapolis & Cincinnati Traction Co.
Interstate P. S. Co.
Lincoln Traction Co.
Monongahela, West Penn Co.
Morris County Traction Co.
Nashville Ry. & Light Co.
Ohio Valley Elec. Ry. Co.
Olean, Bradford & Salamanca Ry.
Penna. Ohio Elec. Co.
Poughkeepsie & Wapp. Fall Ry.
Rochester & Syracuse Ry. Co.
Scranton Ry. Co.
Seattle & Rainier Valley Ry.
Southern Penn Traction Co.
St. Louis Elec. Terminal Co.
Stark Electric Ry. Co.
Texas Electric Co.
Tulsa Street Ry. Co.
Washington, Virginia Ry. Co.
Wheeling Traction Co.
Wichita Ry. & Light Co.



ECONOMY Meters are now standard on more than 200 properties. This simple, rugged, energy-measuring device has induced savings, from coast to coast, on both large and small properties, of from 1/3 to 1/2 a cent per car-mile.

From a transportation standpoint, from a record-keeping standpoint, from a "safety-first" standpoint and from a mechanical standpoint the Economy Meter, with car-inspection dials is the most efficient, simple, adaptable and profitable device of its kind. Let us quote you prices and answer detailed questions. Ask about our deferred payment plan.

Economy Electric Devices Company

L. E. GOULD, Pres., Old Colony Bldg., Chicago



1500 Safety Cars during 1924

During 1924 we furnished Safety Car Control equipments for 1500 Safety Cars.

This is another record which proves conclusively the growing popularity of the Safety Car.

Throughout the coming year, on more than 400 Traction properties, Safety Cars will continue to be a means of promoting prosperity because of the operating economies which they effect.



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

INTERBOROUGH RAPID TRANSIT CO.

Multiple Unit Door Control

OKONITE Wire Used Exclusively

Every precaution has been taken to insure the safety of the passengers and the reliability of operation.



Door detail showing signal light and safety buffer

Ten Car Train Equipped with Multiple unit door Control

THE OKONITE COMPANY, PASSAIC, N. J.

INCORPORATED 1884

Sales Offices: New York • Atlanta • Pittsburgh • San Francisco

General Western Agents: Central Electric Company, Chicago, Ill.

F. D. Lawrence Electric Co., Cincinnati, O.

Novelty Electric Co., Philadelphia, Pa.

Pettingell-Andrews Co., Boston, Mass.

Canadian Representatives: Engineering Materials Limited, Montreal



Right at the



In the words of a prominent Mid-Western electric railway executive:-

"I firmly believe that the bus has its proper place in the transportation world, not as a competitor, but as a feeder to the present street and inter-urban transportation agencies."

transfer point —

buses build up goodwill as well as revenue!

Children hurrying home from school;—tired men and women on their way from business!

It isn't hard to figure the goodwill value of Mack Bus service that will give them the convenience of quick easy transfer at junction points or at the end of the line.

Electric railways have already proved the value of the Mack Bus as a feeder and extension service to existing car lines. They have found the necessary combination of attractive appearance, comfort and practical road-worthiness in Mack Bus design,—all bus from bumper to tail light.

And they have found the vital factors of dependability, low maintenance and low depreciation in these exclusive Mack features—

The sturdy long-life Mack engine.

A specially designed low bus chassis.

Wide tread, assuring safety and permitting a short turning radius.

The Mack dual reduction drive axle especially designed to give maximum road and under-body clearance.

The Mack transmission with ground gears.

Dual system of brakes on wheels and drive shaft.

Mack Shock Insulator. (All spring ends are embedded in rubber shock insulator cushions, eliminating metallic contact between springs and frame, absorbing vibrations, affording yielding support to springs and banishing shackle wear and lubrication.)

MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY

25 BROADWAY

NEW YORK CITY

Eighty-three direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

The Mack Bus



25 Passenger, City Type

Performance counts!

New light on the wire wear question

Taking as a basis the standard practice in trolley wire removal, of one of the largest electric railway companies, the accompanying tabulation gives the results of a study of the relation between wear and renewal point for hard drawn copper and Phono-Electric Trolley Wire.






Note that high tensile Phono-Electric, apart from its proved ability to outlast hard drawn copper three to four times, can safely be used until its area has been reduced 15% below the limit for copper—meaning a further additional 45% wear.

Alternatively the greater tensile strength of Phono-Electric can be used for increased span between supports at a consequent saving in line installation.

Either way Phono-Electric economies are tangible



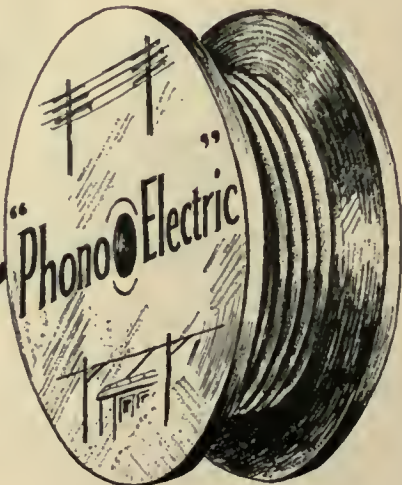
Relation between breaking strength and wear for 2/0 Phono-Electric and 2/0 Hard Drawn Copper

		COPPER		PHONO-ELECTRIC	
		B.S. lb.	Condition	B.S. lb.	Condition
	V.D.—364.8 mls Area—.1046 sq.in.	5520	New	8200	New
	V.D.—300' mls Area—.08108	4280	Good	6300	Above new copper
	V.D.—275 mls Area—.07214	3810	Fair	5650	Still above new copper
	V.D.—250 mls Area—.0633	3340	Dangerous	4960	Above good for copper
	V.D.—200 mls Area—.0466	2460	must come down	3650	Dangerous
	V.D.—150 mls Area—.0311	1640	Down	2435	Must come down

“Bridgeport”
TRADE CO. MARK
Phono-Electric
Members of the Copper and Brass Research Association.



Bridgeport Brass Company
Bridgeport Connecticut



It's 1925—the time to standardize your bus equipment!

WHILE others experiment—test out—and feel their way along with changing models and different styles of buses, you can standardize at once.

The Fifth Avenue Type L Bus is essentially the same design and construction now as the first one was four years ago. Improvements? Yes, of course! But no radical changes are made, no altered models are developed from year to year to create an artificial stimulation for sales.

One standard type of bus, one standard stock of interchangeable unit parts from engine to rear end, one single standard method of maintenance—these are the long-established qualifications of Fifth Avenue Buses, which appeal most strongly to electric railway managements. Our own bus operating experience of fifteen years has dictated this policy.



Type L FIFTH AVENUE BUSES

Capacity:

Seats 55 passengers in comfort, twice the load of the ordinary single-deck bus.

All-weather tops:

A practical feature which makes the upper deck an open-air rider's paradise, in summer, and a comfortable, sheltered car in winter.

Overall-height:

Less than 14-feet clearance required with top in place.





Interurban train on the Ephrata Lebanon

Interurbans—



Pacific-Northwest Traction Co.

Dozens of fine high-speed roads have been using Miller Trolley Shoes for many years

Over eight years ago, the pioneer Miller Trolley Shoe installation was the Portland-Lewiston Interurban, still a firm believer in this sliding contact equipment. Their records of wire wear over this long period conclusively demonstrate the superior economy of sliding contact.

The Interstate Public Service, the Hudson Valley, Pacific Northwest Traction, Waterloo Cedar Falls Northern—these are but a few of the other leading long-time users.

On this class of railway—ability to cling to the wire at high speeds with less trolley tension, is the outstanding advantage which leads to the choice of Miller Trolley Shoes.

Your New Year Resolution



Miller Trolley Shoes



Street Scene in the City of Fort Worth, Texas

and city cars!

Now city roads, including the 1924 Coffin Medal Winner, find them most satisfactory

For the second consecutive time, the Coffin Medal Prize went to a Miller Shoe equipped road last year. And this road, the Northern Texas Traction Co., uses Shoes on all its cars—city cars—interurbans. By exclusive use of Trolley Shoes throughout, thus avoiding intermingling of shoes and wheels on the same line, they have cut trolley troubles and trolley costs immensely.

Where one-man cars are generally used, a trolley which stays on the wire at curves and busy intersections, and on railroad crossings also, is a tremendous advantage.

**More mileage — better contact —
less cost**

“Modernize Trolley Contact”



One-man Safety Car of Northern Texas Traction Co.

**MILLER
TROLLEY
SHOES**
(Patented)

“Less Wire Wear”

Co.-Boston-21, Mass.



734,212 Mile



A good pinion kept "good" by proper lubrication!

WHEN this veteran pinion came back to the New York, Westchester & Boston Railway Company, after being exhibited at Atlantic City, the store-room employees had difficulty in distinguishing it from a new one.

That's how little wear it showed!

And now it's going back on *one of the new cars*, ready for many years more of useful life.

Throughout twelve long years of high-speed, high acceleration service, express and local, on this road, Galena Lubricants have been the bulwark of

defence against wear. And that's the record Galena Lubricants have written throughout the steam and electric railway maintenance field.

The reason is well-known to the majority of railway master mechanics. They know that Galena means "prime lubricants," not by-products, and they know that Galena also means a bona-fide mechanical and lubrication service which is measured by results like the example illustrated above. Such results show chiefly in the reduced maintenance account.



Galena-Signal Oil Company

New York

Franklin, Pa.

Chicago

and offices in principal cities



Since 1912 and Good as New Today



Here's the Equipment Data!

1. Nuttall B. P. Pinion No. 237.
2. N. Y., Westchester & Boston Ry.
3. In Service About 12 Years.
4. Total Mileage 734,212.
5. 2—West, No. 409 B (175 hp.) Motors.
6. Speed—55 m.p.h.
7. Acceleration $1\frac{1}{2}$ m.p.h.p.s.
8. Braking $2\frac{1}{2}$ m.p.h.p.

1924-ENGINEERING

THERE is romance in the continual progress of the electrical industry. To laymen it is a fascinating story. To men in the industry it is an intensely interesting subject of study—and a profitable one. Careful study of recent developments reveals not only the progress made during the year but its vast promise for the future.

This Annual Statistical Number of the *Electric Railway Journal* is a constructive review of 1924 activities in the electric railway business, and an inspiring survey of the possibilities for progress during 1925—a valuable source of information for everyone connected with the industry.

For those especially interested in this subject, “*Engineering Developments in 1924*”, an intimate report of General Electric progress in the manufacture and application of electrical products is published in the January issue of *The General Electric Review*. It is thorough and comprehensive, but too long for republication here. A digest of it is given on the opposite page. Turn to your copy of the *Review* for the article in full, or if you haven’t one at hand, write today for a copy of this issue, addressing *The General Electric Review*, Schenectady, N. Y.



GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

DEVELOPMENTS-1924

Progress in the manufacture of these products and their application to industry is described in *Engineering Developments in 1924*, in the January *General Electric Review*.

Generation

Turbines—First unit for operation with 1200 lb. steam pressure installed; large high speed turbines constructed.

Waterwheel Generators—Second 65,000-kv.-a. unit installed at Niagara Falls; many other large size generators constructed.

Automatic Stations—Standardization carried out; increased use for hydro-electric generators in mining and industrial service; supervisory control systems developed.

Distribution

Frequency Converters—Exceptionally large size converters used to regulate power transferred between systems of different frequencies; automatic control used.

Switching Apparatus—Standardization continued in 66,000-volt equipments for outdoor stations; new industrial substation provides for switching of 13,200-volt incoming line and stepping down to 440-volt and 110/220-volt; high interrupting oil circuit breakers improved; new top-connected moderate interrupting capacity breakers produced; high capacity direct-current air circuit breaker developed.

Mercury Connectors—Glass enclosed connectors filled with mercury and inert gas developed for switching service where usual copper or carbon contacts are unsatisfactory.

Transformers—Largest self-cooled transformers, 15,000 kv.-a., largest water-cooled units, 20,000 kv.-a., and largest air blast units, 18,500 kv.-a., installed during 1924; marked improvements made in methods of changing transformer voltage under load; new load indicator for distribution transformers produced.

Subway Primary Cutout—Fusible primary cutout, operating on new principle, provides economical protection for all apparatus.

High Voltage Bushings—Oil-filled bushings, standard for operating voltages above 73,000 developed for voltages between 50,000 and 73,000; oil-filled terminals for high voltage underground cables produced and standardized.

Conductor Cable—Progress in developing insulated underground high tension cables included trial of single conductor paper insulated cable for 110-kv. circuit no larger in size than 66,000-volt circuit cable now in use.

Cable Testing Sets—Increased use of kenotron testing sets; research in deter-

mination of fault reduction continued with new 200,000-volt outfit.

Industrial

Industrial Motors—Single-phase motor development continued; new synchronous motors constructed for compressor drive; high-speed drawn-shell motor produced for "built in" operation of small machines.

Industrial Motor Control—Enclosure of motor starters and speed controllers completed; fractional horse-power motor controls improved; new control devices developed.

Motor Applications—New motors used to drive boiler stokers and fans, newspaper presses, textile finishing machinery, tower hoists, conveyors, and woodworking machinery.

Mining—Largest automatic mine hoists yet installed are equipped with current limit of retardation and rope speed limit when handling men.

Steel Mills—A 14-in. continuous merchant mill equipped with electric drive rolls large tonnage of diversified products; individual drives with wide speed range enable it to do work of two or three less flexible mills.

Elevators—Improved speed regulation of high speed elevators provides accurate landing and regular speeds at all loads.

Industrial Heating—Increased use of electric furnaces for heat treating and vitreous enameling.

Electric Welding—New type direct-current arc-welding generator produced; increased use of automatic arc welders; welding of galvanized iron with suitable electrode proved feasible.

Transportation

Electric Ship Propulsion—More ships equipped with Diesel-electric drive; new electric mooring winch first used.

Steam Railroad Electrification—Sixty-ton oil-electric switching locomotive built; unusual freight locomotives built for N.Y., N.H. & H. Railroad convert trolley alternating-current to direct-current for driving motors.

Electric Railways—Many lighter weight cars installed; extensive rehabilitation of rolling stock and supply equipment; increased use of automatic substations.

Mine and Industrial Haulage—Seventy-five-ton storage battery locomotive, largest of type, placed in service; standard arrangement of control adopted for all locomotives provides for either drum or contactor control.

Scientific

Lightning Generator—Continued research in the effects of lightning on transmission lines demonstrated that grounded wires near line contactors reduce lightning voltages and provide excellent protection against direct strokes.

X-Ray Tubes—250,000-volt, 50-milli-ampere tubes placed in commercial production for first time; very small tubes, recently developed, make possible a complete self-contained portable X-ray outfit.

Fused Quartz—Production of clear fused quartz commercialized; opaque fused quartz used for insulations for high tension experimental work.

Miscellaneous

Totalizing Recording Wattmeters—New totalizing recording wattmeters make possible direct, automatic control of indicating apparatus, control apparatus, signal systems, and anything dependent upon magnitude of station load.

Electrically Operated Flow Meters—

Vacuum gauges and a water level indicator produced which utilize the principle of the electrically operated flow meter, permitting indicating instruments to be located at any distance from apparatus.

Radio—Quality of radio transmission improved; low power tube transmitters installed on destroyers; equipment developed to convert ship's spark transmitters to continuous wave.

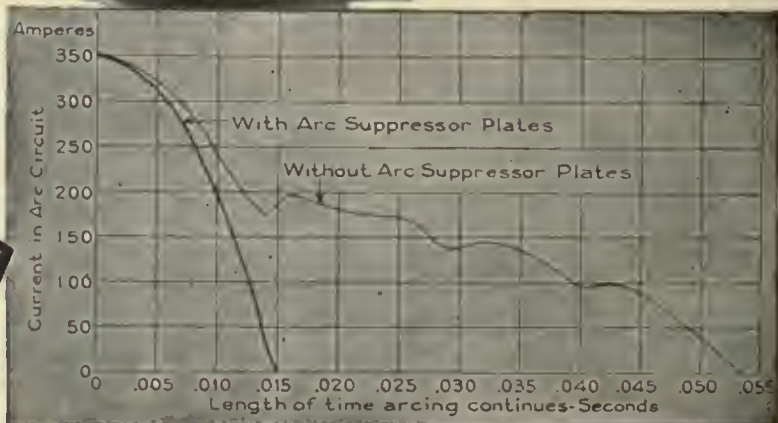
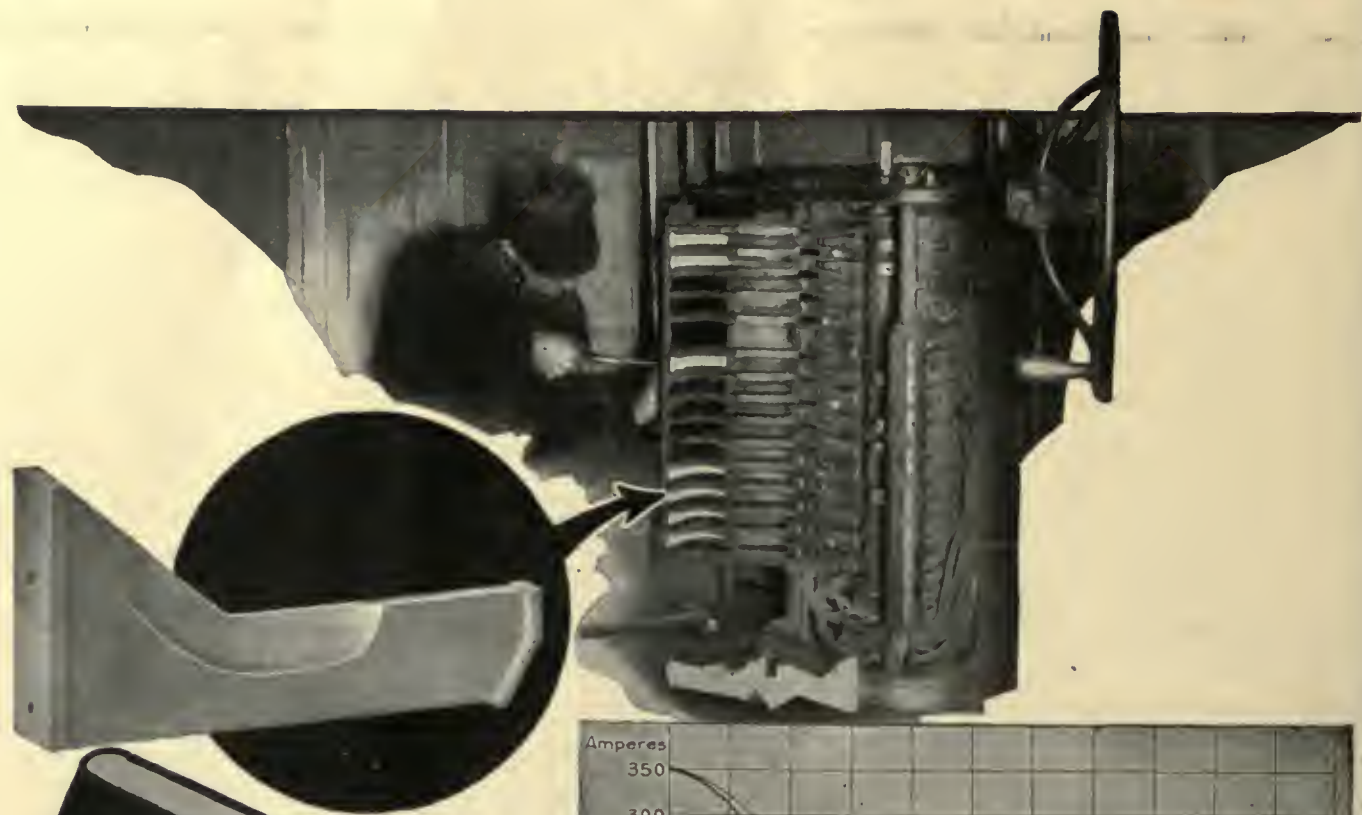
Carrier Current—New standard multi-power set embodies inter-phase operation, single-frequency duplex, and selective ringing; practical portable set manufactured for central station use.

Lighting—Use of incandescent lamps showed marked increase; new dust-proof lighting units for industrial plants produced; lighting beacons installed on U.S. Air Mail fields; radio transmission of photographs made possible by use of small high speed MAZDA lamp; research made in use of light to show strains in structural material; complete line of traffic signalling apparatus designed; floodlighting units developed for railway yard use; more intensive street illumination ordered by many cities; standardization of street lighting classifies streets and proper lighting intensities for each class.

Supercharger—New, lighter type supercharger, with superior cooling, developed.



ELECTRIC
SALES OFFICES IN ALL LARGE CITIES



Your Text Book on Equipment Standards



General Electric Company
Schenectady, N. Y.

Sales Offices in all Large Cities



Notice the Difference

These curves show the difference in time required to disrupt the arc in a K-35 Controller when equipped with G-E Arc Suppressor Plates. They are plotted from actual oscillograph test data.

G-E Arc Suppressor Plates reduce carbonization and eliminate much trouble from pitting of contacts. All new Controllers with individual finger blowouts are equipped with them.

It will pay you to put them in your old Controllers. The plates are inexpensive, and easy to install. Try them.

On page 149 of your G-E Catalog is the list of G-E Controllers for which Arc Suppressor Plates are available, stating the number required and fingers to be protected.

GENERAL ELECTRIC

New York, January 3, 1925

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HARRY L. BROWN, *Editor*

Volume 65
Number 1

Electric Railways Are Forging Ahead

ELECTRIC railways of the United States and Canada purchased 4,092 new cars and locomotives during the year 1924. This is more than in any year since 1913. They also increased their facilities for handling the public by purchase of 963 new motor buses. They junked 1,853 old cars—more than in any year of which this paper has record. They built 312 miles of track extensions, which is the most in any year since 1918. They reconstructed 764 miles, exceeded only by the high figure of 1923, namely 854 miles. The total of track built and rebuilt and new electrification amounts to 1,160 miles—greater than in any year since 1915.

During the year 1924 the electric street and inter-urban railways of the United States expended \$262,700,000 in the purchase of materials, supplies and equipment for new plant and for maintenance purposes. In 1925 they plan to spend for the same items \$342,000,000. This is more than in any recent year and it gives the prospect of increasing activity along the line of improvements and expansions during the new year. In other words, the program of modernization is to go forward with even greater intensity.

During the year just past more new financing for electric railways was done than in any recent year. The total of items exceeding \$200,000 was \$85,085,000, which was over four times the amount sold in 1923. And this was done on better terms than heretofore. Much greater use was made of the car trust plan in financing purchases of new rolling stock. A new feature of the year's financing was the employment of the passenger partnership or customer ownership method to the extent of \$9,750,000 by 10 strictly electric railway

properties. Maturities of large bonded obligations during 1925 will amount to \$28,224,000, which is only about one-third of the similar obligations that had to be met in 1924.

The number of new receiverships during the year was 12, the same as last year. Companies coming out of receivership numbered 18. The total capital involved in all roads remaining in receivership at the end of 1924 is \$117,000,000 less than the total at the end of 1923, and the mileage is 338 less.

The use of buses by electric railways is rapidly extending. The number of companies operating buses increased during 1924 from 121 to 156. The number of buses owned increased from 1,207 to 2,462. Further large additions to the bus equipment of the electric railways is known to be imminent.

In a few words, then, this is the picture of the progress of the industry during 1924 as shown by the statistics compiled by the JOURNAL editors and presented in this number. It is indeed impressive. Far from going backwards, the industry is forging ahead. It is improving its condition in every respect. It is getting rid of old cars and putting new ones in service to secure more economical operation and make the service more attractive. It is supplementing the rail service with bus lines. The fear of buses has given way to a pretty definite idea of where and how to capitalize upon this new transportation tool. Public relations are much improved. Fares are adjustable and are up about where they ought to be. Labor is more stable. Financing is easier. The American Electric Railway Association is functioning better than ever. Truly, the electric railways have risen to a new plane of stability and security.

Car Design as Reflected by Purchases in 1924

THE number of new cars ordered during 1924 continued at the high level reached in 1923. This is very encouraging as the total volume of electric railway business follows closely the amount of rolling stock purchases and indicates a promising future with more passengers, better service and increased earnings. The 4,000 mark in number of cars ordered, considered as a high average, has again been exceeded this year with a total of 4,092 new cars and electric locomotives. Compared with other years this is the highest since 1913. The years of 1917, 1918 and 1919 were lean ones with the average number of new cars running about 2,400. The low point for rolling stock purchases was in 1921 with but 1,276 cars and electric locomotives. The number purchased in 1922 was 3,538 and in 1923 there were 4,029.

The greatest percentage increase in cars ordered is for interurban service. There is a 26 per cent increase in interurban passenger cars over last year and the total of 538 is the largest for any year since 1913. It is evident that the financial condition of the interurbans is improved. Their traffic and their purchasing power should increase as modernization goes on.

It is interesting to follow the trends in car design as reflected in the statistics year by year. Previous to 1916 cars were heavy, the principal thought being to reduce maintenance through substantial construction. The vestibuling of platforms was an improvement of that period, which was followed by many center-entrance type cars without platforms. In 1916 light-weight construction was a principal feature and with it came the one-man, single-truck car. From 1916 through 1919 the one-man, single-truck car increased in popularity, so that in 1919 this type of car constituted 69 per cent of the total motor-passenger cars purchased for city service. That was the peak for small one-man cars. Since then larger cars have been increasingly favored for one-man operation.

In 1922 cars arranged for operation by either one or two men made their appearance. During 1924 this has been the most common type of car purchased. Thus, the total number of new cars for city service of one-man, two-man type was 1,224, which is 62 per cent of the total number of motor-passenger cars purchased for city service.

An outstanding feature in the development of car design last year was the increased attention given to large articulated units. The Department of Street Railways for the City of Detroit placed a triplex car in service last March and the Brooklyn-Manhattan Transit Corporation has ordered four triplex cars which will be placed in rapid transit service soon. In addition to these orders from car builders, the United Railways & Electric Company of Baltimore remodeled two cars to form a duplex articulated car, which is now being tried out. The Brooklyn-Manhattan Transit Corporation placed a similar type of articulated unit in service last February and the Milwaukee Electric Railway & Light Company is now rebuilding 384 bodies to form 192 duplex articulated units.

The advantages of these types of car include reductions in weight, noise, first cost and operating cost together with possible increase in comfort and convenience for passengers. The particular field of usefulness for articulated cars is in service where train operation

is needed. This applies particularly to interurban and rapid-transit service, since there are few cities where surface traffic is so heavy that such units can be used to their fullest advantage.

Although the statistics for 1924 show that large cars are being purchased most, light weight has been a particular feature of new car design. Previous to 1924 weight reduction for city cars was stressed most, but last year's statistics show that this evolution is strongly penetrating the interurban field. The average weight for the double-truck interurban cars purchased last year was 19 tons for a car 44 ft. long.

Eight outstanding facts are shown by the 1924 statistics of electric cars ordered. First, the total number of new cars and electric locomotives is the highest of any year since 1913. Second, the number of passenger cars purchased for city service decreased 32 per cent from the 1923 figures. Third, the number of passenger cars purchased for interurban service increased 26 per cent over 1923 and the number is the largest for any year since 1913. Fourth, the number of electric locomotives bought in 1924 is but one-third as many as in 1923. Fifth, cars built for operation by one man or two men constitute over 62 per cent of the total motor-passenger cars ordered for city service. Sixth, multiple bodied articulated cars are receiving particular consideration. Seventh, light-weight car construction has been given increased attention. Eighth, four-motor equipments are used for the majority of double-truck cars.

Bus Operation by Electric Railways Shows Satisfactory Progress

NOTHING could promise better for the continued success of bus operation by electric railways than the gratifying progress that has been made during the past year. The number of buses has more than doubled while the number of railway companies engaging in bus operation is nearly a third larger than a year ago.

This growth is a healthy sign. It has been rapid enough to indicate that the railways are thoroughly alive to the opportunities which the bus has created, but it has not been too fast. That is to say, railways have not rushed into the use of buses without careful analysis of transportation needs and the ability of buses to fill them.

Particular significance attaches to the fact that the increase in the number of buses has been proportionately much greater than the increase in the number of railway companies operating them. In other words, the primary reason for the great development during the year is that many railways have found buses useful and have added to the number which they were operating a year ago.

This seems to indicate that the experience of those who have tried bus operation has for the most part been satisfactory. In fact, according to the reports which the JOURNAL has received, only one important railway which operated buses a year has abandoned this type of service. In this instance a street railway line was built into the district formerly served by the buses, and with the inauguration of car operation there was no longer any need for the buses.

Another reason for the increase in the number of buses is, of course, the constantly growing number of railway companies which have undertaken this form of transportation service. Since the publication of a list

of electric railway bus operators in the 1924 Statistical Number of this paper, a net addition of 35 companies has been made to the list. A majority of the newcomers in the bus business have been among the smaller railways, and the number of buses which they operate is not large. Nevertheless, this expansion is an interesting indication of the widening understanding of the field of usefulness of the bus.

Buses ordered during the year by electric railways total nearly 1,000. This figure is much larger than that for any previous year. Indications are that it will be greatly exceeded in 1925. That the number of buses ordered is 963 while the number shown as added to the equipment of electric railways is 1,255 may be accounted for in large measure by the acquisition of many independent bus lines, together with much second-hand equipment.

These record-breaking figures for buses owned and ordered by electric railways during the past year carry all the more weight because of the care exercised in obtaining the information. In nearly every case this was secured directly from an official of the company concerned. Because bus operation is carried on in certain instances by a subsidiary under another name, however, it is possible that a few railways have been omitted from the list. Such omissions, if they exist, do not greatly affect the figures, and their inclusion would serve only to augment a total which is already impressive.

More New Track Built than in Any Other Recent Year

THAT a greater mileage of new electric railway track was built in 1924 than in any other year since 1917 is particularly significant because this occurred during a period when the number of buses operated by railway companies was more than doubled. Thus it seems that the industry is expanding simultaneously in two directions. On the one hand the railways each year are furnishing more and better bus service, while on the other hand they are increasing their trackage to provide additional car service.

A study of the details of track extensions made during the past year by 112 different companies shows that the increase was due to many small additions rather than to a few very large ones. A majority of the railways reporting extensions constructed less than 4 miles apiece. Thirteen railways added 5 miles or more to their trackage. In California the San Diego Electric Railway built 19 miles of interurban line and 3 miles of city track. Other large extensions include those of the Philadelphia Rapid Transit Company and the Detroit United Railway with about 11 miles each, and the Cincinnati Traction Company, Pacific Electric Railway and Toronto Transportation Commission with more than 10 miles each.

From the figures of track rebuilt the impression is derived that the industry has nearly caught up with its deferred reconstruction. The total for 1924 was just over 764 miles, which is slightly less than for the preceding year. It is larger, however, than for 1922 or for any other post-war year, except 1923.

Electrification of steam railroad lines continued at a rate considerably in excess of that of the preceding year or any year since 1919. A total of more than 80 miles was electrified during 1924. The combined total

of electrifications and electric railway track built and rebuilt exceeds the corresponding figures for 1923, and is the greatest for 7 years.

Electric Railway Costs Becoming Stabilized

IN LAST year's Annual Statistical Number the prediction was made that electric railway operating costs were becoming stabilized and that little change should be anticipated during the year. That this forecast was justified may be seen by reference to the article in this week's issue by Professor Richey, in which he presents the trend of costs and fares during 1924. In wholesale prices the changes from month to month were fractional, the index for November, 1924, being 153 as compared with 152 for the corresponding month of 1923. Construction costs showed a small but steady downward trend during the year, falling 11.7 points to 203.6 for December. Electric railway operating materials showed a smaller drop, from 158 to 149. Wages, on the contrary, went up from 216.4 to 220.8, but this was about balanced by an increase in fares from 142.4 to 148.1.

All of these figures show a notable stabilization in costs as compared with the violent fluctuations of the years before. It means that managers can now proceed with more confidence in making estimates for expenditures, and can plan for the future with the assurance that their calculations will not be upset overnight.

With conservatives in control at Washington, and a continuing constructive national policy, it seems fair to assume that in the year just beginning the stabilization of last year will be continued. This points clearly to prosperity for the country as a whole and a continuation of satisfactory conditions for the majority of the electric railways. While it is too early to be certain, the probabilities seem to point in the direction that these conditions will prevail all through the Coolidge administration.

Are Your Job Seekers Treated This Way?

HE STEPPED into the anteroom of the office of B. J. Fallon, general manager Chicago Rapid Transit Company, with the timid, apologetic air so often observed on the face of the job seeker. In half-whispered tones he asked the man at the information desk if this was where he could apply for work. He was put at his ease in a moment. The good-natured information man was not content merely to direct him to Room So and So on another floor, but first wrote down the number on a slip and then called upon a boy to escort the applicant to the correct room. The courtesy of the transaction could not have been exceeded if the visitor had been a wealthy man come to confer a favor.

It is not known whether the applicant was the right man for any railway job, if such job was available. It is certain, however, that he must have left the building with the feeling that this particular railway was not a heartless institution, but a rather human affair after all. If he and a railway job did come together, his reception in the anteroom was the right beginning. Whenever a courtesy bulletin comes down from above, he will not forget his first contact as proof that the management practices what it preaches.

\$342,000,000 of Purchases Planned in 1925

Largest Expenditures in Many Years in Prospect by Electric Railways of U. S. This Year—"Journal's" Estimate of Industry Budget for New Year Shows 30 per Cent Increase Over Purchases of 1924

ELECTRIC railways of the United States will spend in 1925 the sum of \$211,500,000 for new plant and equipment. This is \$73,500,000, or 59 per cent, more than the actual expenditure for new plant and equipment during 1924. They will spend \$130,500,000 additional for maintenance materials and supplies. This is about the same amount as last year.

The total expenditures planned in the tentative budgets of the electric railways for 1925, exclusive of all labor costs, is thus somewhere in the neighborhood of \$342,000,000. This compares with an actual expenditure in 1924 of \$262,700,000—an expected increase for 1925 of 30 per cent.

In compiling these estimates of expenditures, information was requested as to what the railways plan to buy during the coming year and what they did buy during the past year. Under the classification "for new plant and equipment"

was to be included such items as new cars and car equipment, track tools and materials, paving materials, shop machinery and tools, power equipment, buildings and structures, and any other items which will be a permanent part of the railway plant. Under the classification of expenditures "for maintenance materials and supplies" was to be included all items purchased for the regular repair and maintenance work in all departments and the supplies and materials consumed in operation. This includes the numerous detail supplies such as motor brushes, waste, oil, brake shoes, metal stock, wheels, miscellaneous small tools, trolley wire and other line materials for replacements, etc. In both classifications the figures were requested for expenditures exclusive of labor. The sums here presented are thus of course only a part of the enormous outlay of moneys by the electric railways to cover all operating expenses and the charges to capital account.

The figures are tabulated herewith to show a comparison of the probable expenditures during 1925 with the estimates of actual expenditures during the years 1922, 1923 and 1924. From this it will be seen that the new year holds forth the prospect of larger expenditures than in any previous year since the JOURNAL started this estimate of the industry's budget. Looking at the figures by major accounts, all items show an increase over former years except one. The purchases for maintenance of equipment show a decrease of about \$2,000,000.

The largest increases in comparison with last year are for new equipment and new power facilities. For the latter there is an indicated increase in expenditures of 90 per cent; for new equipment, an increase of 71 per cent. But there is also to be a large expansion of trackwork, this indicated increase being 35 per cent.

The method employed this year in compiling this estimate of the budget of the electric railway

industry is the same as that followed last year and the year before and explained in detail on page 30, issue of Jan. 6, 1923, and again on page 4, issue of Jan. 5, 1924. This year budget figures were received from 51 companies, from which the estimate of the whole industry was calculated, using as heretofore both track mileage and cars operated as bases of spreading the known budget units. The average of the two methods was used for the final figures, since neither alone is a

proper measure of the buying power of the industry.

By requesting not only the estimate of expenditures planned for the new year but also the actual expenditures made during the year just past, the JOURNAL obtains a check upon its previous year's estimate of the future purchases. The actual figures this year are in close agreement with the amounts estimated last January, as follows:

"ELECTRIC RAILWAY JOURNAL'S" ESTIMATE OF EXPENDITURES OF THE INDUSTRY				
New Plant and Equipment				
	1922	1923	1924	1925
Way and structures	\$85,000,000	\$74,000,000	\$56,000,000	\$75,700,000
Equipment	38,000,000	78,000,000	60,200,000	103,400,000
Power	28,000,000	28,000,000	17,000,000	32,400,000
Total	\$151,000,000	\$180,000,000	\$133,200,000	\$211,500,000
Maintenance Materials and Supplies				
Way and structures	\$42,000,000	\$57,500,000	\$58,200,000	\$58,200,000
Equipment	44,000,000	54,000,000	52,100,000	52,100,000
Power	16,000,000	18,000,000	20,200,000	20,200,000
Total	\$102,000,000	\$129,500,000	\$130,500,000	\$130,500,000
Total of New Plant and Maintenance Materials				
Way and structures	\$116,000,000	\$113,500,000	\$113,900,000	\$113,900,000
Equipment	122,000,000	114,200,000	155,500,000	155,500,000
Power	44,000,000	35,000,000	52,600,000	52,600,000
Grand total	\$282,000,000	\$262,700,000	\$342,000,000	\$342,000,000

NEW PLANT AND EQUIPMENT		
	Estimated in Issue of Jan. 5, 1924	Actual Disclosed This Issue
Way and structures	\$53,000,000	\$56,000,000
Equipment	70,000,000	60,200,000
Power	27,000,000	17,000,000
Total	\$150,000,000	\$133,200,000
MAINTENANCE MATERIALS AND SUPPLIES		
Way and structures	\$44,000,000	\$57,500,000
Equipment	53,000,000	54,000,000
Power	15,000,000	18,000,000
Total	\$112,000,000	\$129,500,000
TOTAL FOR NEW PLANT AND MAINTENANCE MATERIALS		
Way and structures	\$97,000,000	\$113,500,000
Equipment	123,000,000	114,200,000
Power	42,000,000	35,000,000
Grand total	\$262,000,000	\$262,700,000

This comparison is of course not a measure of the accuracy of the JOURNAL'S work, but rather a statement of the extent to which budget plans were actually carried out and expenditures made within the year in which they were anticipated.

Bus Operation by Electric Railways Doubled During 1924

The Number of Railway Companies Furnishing Bus Service Has Increased from 121 to 156 and Many Others Have Extended the Scope of Their Operations—Buses Now Operated by Railways Total 2,462—A Larger Number Were Ordered During 1924 than in Any Previous Year

AT THE end of 1924 the number of buses operated by electric railways in the United States and Canada was approximately twice the number in operation a year ago, as shown in a survey conducted by this paper. This big increase occurred in large measure because many railways which were operating buses in 1923 added more during the year just past. At the same time there was also a marked increase in the number of companies engaged in these undertakings. Figures given in the accompanying tables are based on replies received directly from the companies named and may be taken to represent an irreducible minimum. Because bus operation is carried on in some instances in the name of a subsidiary company, it is possible that a few smaller railways have been omitted from the list. Their inclusion, however, would not greatly affect the total figures.

The expansion was confined to no one section of the country. The largest increase in the number of buses was made by a railway on the Atlantic seaboard, while a company in Ohio was second, and another in California added the third largest number. Substantial

increases were made in nearly every state and also in Canada.

During the year the largest single addition to the number of buses operated was made by Public Service Railway, Newark, N. J., which added more than 500 buses to its equipment. This was done as part of an extensive plan to buy out competitive buses and co-ordinate the transportation service throughout the area where the railway operates. Already great progress has been made toward this end. There remain, however, a considerable number of buses which are still running in competition with the railway. This competition will have to be eliminated before the transportation system can be entirely co-ordinated. All of the buses thus bought by the railway were second-hand machines. Many of them, however, have since been retired from service and their places taken by new vehicles. For that purpose, Public Service Railway has bought a large number of Yellow Coaches, White, Fageol and Mack buses. More buses of the first two types are on order at the present time and delivery is expected in the near future. As a result of this great expansion, this

List of Electric Railways Operating Buses

Railway	Subsidiary	No. Buses	Railway	Subsidiary	No. Buses
Connecticut			New York		
Danbury & Bethel St. Ry., Danbury.....		4	International Ry., Buffalo.....	International Bus Corp.....	34
Connecticut Co., New Haven.....		60	Binghamton Ry., Binghamton.....		1
Groton & Stonington St. Ry., Norwich.....		5	Jamestown St. Ry., Jamestown.....		11
Hartford & Springfield St. Ry.,			United Traction Co., Albany.....	Capitol District Trans. Co.....	2
Warehouse Point.....		7	Newburgh Public Service Corp., Newburgh.....		32
Waterbury & Milldale Tramway, Waterbury.....		1	Brooklyn-Manhattan Transit Corp., N. Y.....		10
Maine			Niagara Gorge Ry., Niagara Falls.....	Niagara Gray Bus Line.....	5
York Utilities Co., Sanford.....		5	New York State Rys., Rochester.....	East Ave. Bus Co. & Roch. Ry. Co-ord. Bus Line.....	17
Massachusetts			New York State Rys., Syracuse.....	Syracuse Ry. Co-ordinated Bus Line.....	7
Attleboro Branch RR., Attleboro.....		2	New York State Rys., Utica.....	Utica Ry. Co-ordinated Bus Line.....	2
Eastern Massachusetts St. Ry., Boston.....		43	Pennsylvania		
Boston Elevated Ry., Boston.....		66	Altoona & Logan Valley Elec. Ry., Altoona.....	Logan Valley Bus Co.....	11
Connecticut Valley St. Ry., Greenfield.....		3	Sehnykill Ry., Girardville.....		6
Northern Massachusetts St. Ry., Greenfield.....		1	Johnstown Traction Co., Johnstown.....	Traction Bus Co.....	5
Holyoke St. Ry., Holyoke.....		2	Conestoga Traction Co., Lancaster.....	Conestoga Trans. Co.....	2
Union St. Ry., New Bedford.....		3	Lewistown & Reedsdale Elec. Ry., Lewistown.....	Lewistown Trans. Co.....	2
Middlesex & Boston St. Ry., Newtonville.....		12	Beaver Valley Traction Co., New Brighton.....		6
Plymouth & Brockton St. Ry., Plymouth.....		2	Citizens Traction Co., Oil City.....	Citizens Transit Co.....	4
Springfield St. Ry., Springfield.....		9	Philadelphia Rapid Transit Co., Philadelphia.....	Phila. Rural Transit Co.....	17
Rhode Island			Westmoreland County Railway, Pittsburgh.....		2
Newport Elec. Corp.....		7	Pittsburgh, Harmony & Butler & New Castle Ry., Harmony.....		5
United Electric Rys., Providence.....		48	Jefferson Traction Co., Punxsutawney.....		2
Vermont			Reading Transit & Light Co., Reading.....		3
Twin State Gas & Electric Co., Brattleboro.....		3	Seranton Ry., Seranton.....	Seranton Bus Co.....	2
Delaware			Northumberland County Ry., Sunbury.....	Sunbury Transit Co.....	2
Tide water Power Co., Wilmington.....		3	Philadelphia & West Chester Traction Co., Upper Darby.....		3
District of Columbia			West Chester St. Ry., West Chester.....	Peoples Transportation Co.....	21
Capital Traction Co.....		11	Williamsport Pass. Ry., Williamsport.....	Williamsport Transp. Co.....	3
Washington Ry. & Electric Co.....		23	York Rys., York.....	York Transit Co.....	5
Washington & Virginia Ry.....		2	Virginia		
Maryland			Newport News & Hampton Ry., Gas & Electric Co., Hampton.....		5
United Rys. & Electric Co., Baltimore.....	Baltimore Transit Co.....	44	West Virginia		
Potomac Edison Co., Cumberland.....		2	Wheeling Public Service Co., Wheeling.....		4
Potomac Public Service Co., Frederick.....		15	Monongahela Power & Ry., Fairmont.....	Pioneer Transport Co.....	3
New Jersey			Princeton Power Co., Princeton.....		1
Millville Traction Co., Millville.....		7			
Coast Cities Ry., Asbury Park.....		20			
Public Service Ry., Newark.....	Public Service Trans. Co.....	593			
Morris County Traction Co.....		1			
Trenton & Mercer County Trac. Co., Trenton	Central Transportation Co.....	19			

List of Electric Railways Operating Buses (Concluded)

Railway	Subsidiary	No. Buses	Railway	Subsidiary	No. Buses
Illinois			Arkansas		
Centralia Traction Co.....		1	Inter-City Terminal Ry., North Little Rock.....		12
Chicago & West Town Ry., Oak Park.....		7			
Chicago, North Shore & Milwaukee, Highwood.....		43	Georgia		
Evanston Ry., Evanston.....	Evanston Bus Co.....	5	Columbus Electric & Power Co., Columbus... Columbus Trans. Co.....		3
East St. Louis & Suburban Ry., East St. Louis.....		6			
Chicago & Joliet Electric Ry., Joliet.....	Chicago & Joliet Trans. Co.....	2	Louisiana		
Illinois Power & Light Corp., Decatur.....		15	New Orleans Public Service, New Orleans.....		10
Illinois Power & Light Corp., Galesburg.....		4			
Illinois Power & Light Corp., Peoria.....		6	Mississippi		
Bloomington, Pontiac & Joliet Ry., Pontiac.....		1	Vicksburg Light & Traction Co., Vicksburg.....		2
Rockford & Interurban Ry., Rockford.....		6			
Tri-City Ry., Rock Island.....		2	North Carolina		
			Carolina Power & Light Co., Raleigh.....		2
Indiana					
Union Traction Co. of Indiana, Anderson.....		1	South Carolina		
Evansville & Ohio Valley Ry., Evansville.....		1	South Carolina Gas & Elec. Co., Spartanburg.....		4
Gary St. Ry., Gary.....		16			
Interstate Public Service Co., Indianapolis.....		11	Tennessee		
Chicago South Bend & Northern Indiana Ry., South Bend.....		13	Nashville Interurban Ry., Nashville.....		1
Iowa			California		
Des Moines City Ry., Des Moines.....		3	Bakersfield & Kern Elec. Ry., Bakersfield.....		5
Mississippi Valley Elec. Co., Iowa City.....		5	Los Angeles Ry., Los Angeles.....	Los Angeles Motor Bus Co.*112	
Dubuque Electric Co., Dubuque.....		3	Pacific Electric Ry., Los Angeles.....	Pacific Electric Land Co.....	154
Waterloo, Cedar Falls & Northern Ry., Waterloo.....	Cedar Valley Road.....	7	San Francisco & Sacramento Ry., T. F., Oakland.....		1
			Key System Transit Co., Oakland.....		13
Kentucky			Pacific Gas & Electric Co., Sacramento.....		4
Louisville Ry., Louisville.....	Kentucky Carriers Inc.....	12	San Diego Electric Ry., San Diego.....		10
			Munic. Ry. of San Francisco.....		10
Michigan			Peninsular Ry., San Jose.....		3
City of Detroit Dept. of St. Rys., Detroit.....		25	Santa Barbara & Suburban Ry., Santa Barbara.....		6
Grand Rapids Ry., Grand Rapids.....		6	Stockton Electric Ry., Stockton.....		3
Michigan Electric Ry., Jackson.....		19			
Muskegon Traction & Lighting Co., Muskegon.....		2	Kansas		
Saginaw Transit Co., Saginaw.....		28	Salina St. Ry., Salina.....		1
Minnesota			New Mexico		
Twin-City Rapid Transit Co., Minneapolis.....		3	City Electric Co., Albuquerque.....		2
Missouri			Oklahoma		
Kansas City, Clay County & St. Joseph Ry., Kansas City.....		6	Tulsa St. Ry., Tulsa.....		16
United Rys., St. Louis.....	St. Louis Bus Co.....	4	Okmulgee Traction Co., Okmulgee.....		3
Springfield Traction Co., Springfield.....		14			
			South Dakota		
Ohio			Sioux Falls Traction System, Sioux Falls.....		8
Northern Ohio Traction & Light Co., Akron.....	Northern Transit Co.....	75			
City of Ashtabula Div. of St. Rys., Ashtabula.....		3	Texas		
Columbus, Newark & Zanesville Elec. Ry., Columbus.....	Columbus & Zanesville Transp. Co.....	13	Abilene Traction Co., Abilene.....		1
Ohio Service Co., Coshocton.....		5	Eastern Texas Electric Co., Beaumont.....		1
Columbus, Urbana & Western Elec. Ry., Steubenville, East Liverpool & Beaver Valley Traction Co., East Liverpool.....	Valley Motor Trans. Co.....	2	Houston Electric Co., Houston.....		18
Hooking Sunday Creek Trac. Co., Nelsonville.....		1	Marshall Traction Co., Marshall.....		1
			San Antonio Public Service Co., San Antonio.....		16
Indiana, Columbus & Eastern Traction Co., Springfield.....		16			
Springfield Ry., Springfield.....		1	Utah		
Pennsylvania-Ohio Elec. Co., Youngstown.....	P. O. Coach Lines.....	39	Utah Light & Traction Co., Salt Lake City.....		1
Youngstown Munic. Ry., Youngstown.....		41			
Youngstown & Suburban Ry., Youngstown.....	Y & S Transportation Co.....	14	Washington		
			Puget Sound Int. Ry., & Pwr. Co., Everett.....		17
Wisconsin			Puget Sound Elec. Ry. Co., Bellingham.....		12
Wisconsin Public Service Corp., Green Bay.....	Riverview Motor Bus Co.....	2	Pacific Northwest Traction Co., Seattle.....	Thompson-Smith Trans. Co.....	31
Wisconsin Gas & Electric Co., Kenosha.....		8	Seattle Munic. St. Ry., Seattle.....		14
Milwaukee Elec. Ry. & Light Co., Milwaukee.....	Wisconsin Motor Bus Lines.....	104	Seattle & Rainier Valley Ry., Seattle.....		2
Eastern Wisconsin Electric Co., Oshkosh.....		14	Puget Sound Electric Railway, Tacoma.....		12
Wisconsin Valley Electric Co., Wausau.....	Valley Transit Co., Merrill Bus Line.....	4			
			Canada		
Alabama			British Columbia Electric Ry., Vancouver.....	British Columbia Rapid Transit Co.....	11
Birmingham Electric Co., Birmingham.....		4	Brantford Munic. Ry., Brantford.....		2
			Winnipeg Electric Ry., Winnipeg.....		16
			Nova Scotia Tramways & Pwr. Co., Halifax.....		2
			Hydro Electric Rys., Toronto.....		4
			Toronto Transportation Co., Toronto.....		20
			Montreal Tramways, Montreal.....		4
			Ottawa Electric Railway, Ottawa.....		5
			Quebec Railway Light & Power Co., Quebec.....		4
			Total.....		2,462

*Includes 78 buses in which railway has one-half interest.

company now owns 593 buses, which is more than twice as many as any other railway in this country. Indications are that a year from now the number of buses owned by Public Service will be considerably larger than it is at the present time.

Second in number of buses added during the year is the Northern Ohio Traction & Light Company at Akron, which now owns 75 buses. This increase has come about as the result of the total suspension of railway service from Feb. 1 to 28 of this year, and the subsequent resumption of operations on a new basis, as told in ELECTRIC RAILWAY JOURNAL for March 1.

In California the addition of 52 buses to the equipment of the Pacific Electric Railway, Los Angeles, was the third largest increase during the year. This company has now become the second largest operator of buses in the country, with 154 vehicles. Of this number 39 are operated by the Los Angeles Motorbus Com-

pany. In this same territory the Los Angeles Railway owns 34 buses, and has a half interest in 78 others, making a total of 112. Altogether the two railways are engaged in the operation of 266 buses in this part of the state. It appears possible that developments during the coming year may deprive the Pacific Electric Railway of second place in number of buses, as the Philadelphia Rapid Transit Company has recently ordered 200 new gas-electric buses for operation in that city.

Important increases have occurred in the number of buses operated by electric railways in New England. The Boston Elevated Railway during the past year has added 35 buses, the United Electric Railways of Providence 20, the Connecticut Company 13, and the Eastern Massachusetts Street Railway 12. In this same region the Middlesex & Boston Street Railway, with 12 vehicles, has joined the ranks of bus operators

as told in this paper for Dec. 6. Other new companies in this region include the Waterbury & Millvale Tramway, the York Utilities Company in Maine, and the Newport Electric Corporation.

Bus operation in New Jersey has advanced rapidly outside of the territory of Public Service Railway as well as in it. At Asbury Park the Coast Cities Railway now has 20 buses. A number of these are double-deck vehicles for use during the heavy traffic summer months. The Trenton & Mercer County Traction Company has increased the total number of its buses to 14 and the Millville Traction Company has jumped from one bus to seven.

Reports received from electric railways in New York State indicate that the expansion of railway bus operation there has not been as great as elsewhere. During the year there has been much talk of the establishment of an extensive system of buses in New York City. Proposals have been made that these vehicles be operated by different independent companies, and several of the electric railways have offered to undertake to furnish such service. So far, however, nothing definite has been done. Upstate the New York State Railways has added 14 buses. The United Traction Company of Albany and the Binghamton Railway are newcomers in the field of bus operation.

An order for 200 gas-electric buses for the Philadelphia Rapid Transit Company is the outstanding bus development of the year in Pennsylvania. Elsewhere in the state a number of new names appear in the list of electric railways operating buses. Among these are the Northumberland County Railway, Pittsburgh, Harmony, Butler & Newcastle Railway, the Reading Transit & Light Company, Westmoreland County Railway, Philadelphia & West Chester Railway and the Scranton Railway. In the vicinity of Philadelphia, the West Chester Street Railway has developed bus service covering nearly 200 route-miles. This was told in ELECTRIC RAILWAY JOURNAL for Nov. 22.

A marked increase in the number of buses operated by electric railways has occurred in Ohio. At Youngstown the Pennsylvania-Ohio Electric Company has added 13 buses to its already large fleet, the Youngstown & Suburban Railway and the Youngstown Municipal Railway have added 10 each. The Ohio Service Company and the Columbus, Urbana & Western Railway have undertaken bus operation. In Indiana the Interstate Public Service

Buses Ordered by Railways During 1924

Name of Company	Total	No. of Each Type	Type of Chassis	Body Builder	Seating Capacity
Philadelphia Rapid Transit Co....	200	125* 75	Yellow Coach Z Yellow Coach Z	Yellow Coach Yellow Coach	66 29
Public Service Railway.....	175	50 75 25 25	White 50 A Yellow Coach Z Mack Fageol	Bender Yellow Coach Mack Fageol	29 29 25 29
Northern Ohio Traction & Light Co. 42		14 10 3 3 6 6	White White Mack Mack Mason Reo	Bender Kuhlman Mack Kuhlman Weatherproof Fitzjohn	21 25 25 25 21 21
Boston Elevated Railway.....	37	17 14 4 1	Mack White White Yellow Coach	Mack Brown Brown Yellow Coach	25 25 25 29
International Ry., Buffalo.....	28	16* 12	..........	..........	..........
City of Detroit Dept. of St. Rys...	26	25 1	Dodge-Graham Gottfreson	Graham Gottfreson	21 ..
Milwaukee Electric Ry. & Lt. Co..	26	10 5* 5 5 1	Yellow Coach Z Yellow Coach Z White 50 A Fageol Pierce-Arrow	Yellow Coach Yellow Coach Bender Fageol Bender	29 67 25 23 26
Los Angeles Railway.....	22	16* 5* 1*	Fageol Moreland Moreland	Fageol Moreland Moreland	58 59 58
Pacific Electric Ry.....	22	12 10*	Fageol Fageol	Fageol Fageol	29 66
Houston Electric Co.....	18	10 1 6 1	Fageol Yellow Coach Yellow Coach Fageol	American Car Co. St. Louis Car Co. Yellow Coach American Car Co.	29 29 29 29
Chicago N. Shore & Milwaukee R.R. 17		13 4	Yellow Coach Z Fageol	Yellow Coach Fageol	29 22
United Electric Rys., Providence 17		13 2 2	White Pierce-Arrow Mack	Brown Brown Brown	29 29 29
Connecticut Company.....	16	4 4 2 2 2 2	Yellow Coach Pierce-Arrow Mack Mack Fageol White	Yellow Coach Pierce-Arrow Mack Bender Fageol Hoover	29 29 25 29 29 29
Coast Cities Ry.....	16	9* 7	Yellow Coach Yellow Coach	Yellow Coach Yellow Coach	67 29
Trenton & Mercer County Tract. Co. 13		11 1 1	Fageol Fageol Six Wheel	Fageol Kuhlman Six Wheel	29 29 29
Middlesex & Boston Street Ry....	12	12	White 50 A	Bender	25
San Antonio Public Service Co.....	12	6 5 1	Fageol Reo Yellow Coach	Fageol Reo Yellow Coach	29 21 29
Interstate Public Service Co.....	11	11	White	Bender	25
New York State Rys.....	11	6 2 2 1	Brockway Mack Brockway Brockway	Bender Lang N. Y. S. Rys. N. Y. S. Rys.	25 22 18 20
Pennsylvania-Ohio Electric Co....	11	10 1	White 50 A White 50 A	Bender Bender	25 20
Chicago S. Bend. & N. Indiana Ry. 10		5 5	Mack Garford	Mack Superior	25 25
Youngstown Munic. Ry.....	10	10	.....	.....	.....
South Carolina Gas & Elec. Co....	10	10	White & Graham	Bender	21
Indiana, Columbus & Eastern Traction Co.....	9	9	Fageol	Fageol	22
Eastern Mass. St. Ry.....	9	2 7	Brockway Fageol	Patterson Fageol	21 27
Key System Transit Co.....	8	7 1	Fageol Ford	Fageol Key System Trans. Co.	29 14
Hartford & Springfield St. Ry....	7	6 1	Gullder Fageol	Patterson & Superior Superior	25 25
Newport Electric Corp.....	7	5 2	Fageol Fageol	Fageol Fageol	22 29
Mesaba Ry.....	7	7	.....	.....	16
Kansas City, Clay County & St. Joseph Ry.....	6	5 1	Fageol Graham	Fageol Graham	28 18
Toronto Transportation Comm....	6	6	White 50 A	Smith Bros. & T.T.C.	29
Eastern Wisconsin Elec. Co.....	6	6	.....	.....	.....
Chicago & West Towns Ry.....	5	5	Mack	Mack	26
New Orleans Public Service, Inc...	5	5	Yellow Coach	Yellow Coach	29
Springfield St. Ry.....	5	4 1	Garford Yellow Coach	Superior Yellow Coach	25 29
Twin City Rapid Transit Co.....	5	1 1 1 1	White Mack White Wilcox	Eckland Bros. Lang Eckland Bros. Twin City	16 30 16 30
Seattle Munic. St. Ry.....	5	5	Fageol	Fageol	29
Youngstown & Suburban Ry.....	5	3 2	Garford Studebaker	S. M. Ry. Miller	29 22 11
Washington Ry. & Electric Co....	5	3 2	Graham Type F.A. Graham Type J.B.	Hoover Hoover	30 20
Gary St. Ry.....	4	4	Yellow Coach	Yellow Coach	29
Illinois Power & Light Corp.....	4	2 2	Yellow Coach Reo	Yellow Coach Reo	29 21
United Rys. & Elec. Co. Baltimore	4	4*	5 Aya. Type L	Fifth Ays.	51
Mississippi Valley Electric Co....	4	4	Mack	Mack	26

*Denotes double-deck bus.

Buses Ordered by Railways During 1924 (Concluded)

Name of Company	Total	No of Each Type	Type of Chassis	Body Builder	Seating Capacity
United Rys. of St. Louis.....	4	4	White	Brown	29
Columbus, Newark & Zanesville Electric Ry.....	4	2	Fageol	Fageol	22
Winnipeg Electric Co.....	4	2	Fageol	Fageol	28
Altoona & Logan Val. Elec. Ry....	4	4	G. M. C. K-20	.....	24
		2	Garford	Garford	25
		2	Garford	Garford	21
Reading Transit & Light Co.....	4	3	Dodge	Graham	22
		1	White	Bender	25
Waterloo, Cedar Falls & N. Ry....	3	3	Mack	Mack	25
East St. Louis & Suburban Ry....	3	3	Yellow Coach Z	Yellow Coach	29
Pacific Northwest Traction Co....	3	3	Fageol	P. N. T.	45
Tidewater Power Co.....	3	3	Graham	Hoover	18
Williamsport Passenger Ry.....	3	3	Reo	Reo	21
Sioux Falls Traction System.....	3	2	White	Eckland	25
		1	Reo W.	Auto Body Co.	21
Wisconsin Gas & Elec. Co.....	3	..	.....	.....	..
Capital Traction Co.....	3	2	White	Bender	25
		1	Fageol	Fageol	29
Columbus Ry. Power & Lt. Co....	3	3	Mack	American Car Co.	29
Munic. Ry. of San Francisco.....	2	2	White 50 A	Brown	25
Springfield Traction Co.....	2	1	Federal	Local	..
		1	Graham	Graham	..
United Traction Co., Albany.....	2	2	Pierce-Arrow	Brown	29
Syracuse & Eastern R.R.....	2	2	Reo W	Patterson Vehicle Co.	..
Carolina Power & Light Co.....	2	1	White	Bender	16
		1	White	Bender	21
Seranton Ry.....	2	2	Dodge-Graham	Dodge-Graham	20
Westmoreland County Ry.....	2	2	Fageol	Fageol	29
Wisconsin Valley Electric Co.....	2	2	G. M. C.	Old body used on new chassis	13
Michigan Electric Railway.....	2	2	.....	.....	..
Aurora, Elgin & Fox Riv. Elec. Co.	2	2	White	Shaefer	..
San Francisco-Sacramento R.R....	1	1	Fageol	Hall-Scott Co.	29
Asheville Power & Light Co.....	1	1	White	White	..
Bloomington, Pontiac & Joliet Ry.	1	1	White	White	16
City of Ashtabula.....	1	1	Mack	Kuhlman	29
Union Traction Co. of Indiana.....	1	1	Pierce-Arrow	Kuhlman	29
York Railways.....	1	1	Fageol	Fageol	29
Marshall Traction Co.....	1	1	Reo	Reo	22
Utah Light & Traction Co.....	1	1	White	White	12
Abilene Traction Co.....	1	1	Reo	Reo	21
Dayton, Springfield & Xenia So. Ry.	1	1	Garford	Garford	21
Waterbury & Milldale Tramway....	1	1	White	Kuhlman	24
Evansville & Ohio Valley Ry.....	1	1	Graham	Graham	17
Binghamton Ry.....	1	1	Mack	Mack	25
Puget Sound Elec. Ry.....	1	1	White	Christy	22

*Denotes double-deck bus.

Company has bought 11 buses. The Union Traction Company of Indiana and the Evansville & Ohio Railway have also entered the bus game. At Decatur, Galesburg and Peoria the Illinois Power & Light Corporation is now operating buses. Co-ordination of railway and bus service at Decatur was described in this paper on Nov. 29. The North Shore Line has added 16 buses to its equipment during the year and the Chicago, South Bend & Northern Indiana Railway has added 10.

Expansion of bus operations has marked the railway situation in the south as well as in other sections of the country. Among the companies which during the past year have undertaken to furnish bus service are the Newport News & Hampton Railway, Gas & Electric Company, Columbus Electric & Power Company in Georgia, New Orleans Public Service, Inc., Carolina Power & Light Company, Nashville Interurban Railway, Abilene Traction Company in Texas and also the Marshall Traction Company. Moreover, the San Antonio Public Service Company, the South Carolina Gas & Electric Company and a number of others have made important increases in the number of buses operated.

On the Pacific Coast there has been a gain in the number of buses operated in other districts besides Los Angeles. The Pacific Northwest Traction Company has added 18 buses during the year and the Pacific Gas & Electric Company has undertaken bus operation. Elsewhere throughout California and Washington the railways have also added somewhat to their bus equipment.

Electric railways in Canada have made noteworthy progress in bus operation. The greatest increase in the number of vehicles is that of the British Columbia Electric Railway, Vancouver, which has added nine. The Toronto Transportation Commission has also extended the scope of its bus operation. New railways in Can-

ada listed among those operating buses at present are the Brantford Municipal Railway, the Hydro-Electric Railways, the Ottawa Electric Railway, and the Quebec Railway, Light & Power Company.

MORE BUSES BOUGHT THAN IN ANY PREVIOUS YEAR

The number of buses ordered during 1924, according to information compiled by ELECTRIC RAILWAY JOURNAL, was 963. This is an increase of 342 over the number ordered during 1923 and is greater than the number ordered in any previous year. An interesting fact in this connection is that 191 of these were double-deck buses. By far the largest single order of double-deck buses was that of the Philadelphia Rapid Transit Company, which purchased 125. Others were bought in Baltimore, Milwaukee and Los Angeles. Altogether upward of 70 electric railways are included in the list of those ordering new buses during the year.

Other automotive equipment ordered during the year was approximately the same as the year before. The number of trackless trolleys bought was somewhat less, totaling only seven.

Seventy-three trucks of various sorts were bought by electric railways. Miscellaneous automotive equipment, including tower trucks, snow loaders, automobile welding outfits and fire apparatus, numbered approximately 25.

	Motor Buses Ordered	Trolley Buses Ordered	Other Automotive Equipment Ordered	Total
1922.....	240	6	112	358
1923.....	621	15	148	784
1924.....	1063	7	105	1175
Increase 1924 over 1923.....	442	8*	43*	391

* Denotes decrease.

In addition to the buses for which orders have actually been placed, the Detroit United Railways has completed arrangements for financing the purchase of 75 such vehicles. It is understood that these will be 25 single-deck, 29-passenger buses, 10 double-deck, 66-passenger buses, both groups to have six-cylinder motors, and 40 more single-deck four-cylinder buses.

Statistics of the Industry

IN EACH of the Annual Statistical Numbers for some years back, tables have been published showing by states the miles of track and cars operated by the electric railway companies in the United States. A corresponding table, made up from reports obtained for the 1925 McGraw Electric Railway Directory will be published in an early issue of this paper.

It is hoped at the same time to publish a table showing a division of the electric motor-passenger cars into the following classes: City and interurban; one-man, two-man and one-man-two-man. Owing to the desire to base these tables on statistics from the 1925 directory, it has been impossible to publish them this week.

Notes on the News of the Year

An Attempt to Touch Upon Some of the High Spots of the Year's Work—Serious but Not Too Serious—Many of the Important Events of 1924 Originally Reported to the Extent of 2,000 Pages Pressed Now Into Five

By G. J. MacMurray

News Editor ELECTRIC RAILWAY JOURNAL

APROPOS of the present occasion are the lines of Lewis Carroll to the effect that "Time has come, the walrus said, to speak of many things." Most of it, however, is old stuff. The writer of a review of this kind is in much the same position as was Twain's barber. Running his hand over the face of his illustrious customer, the barber remarked: "Shall I go over it again?" "No," said Mark in his drollest tone, "I heard you the first time." He is telling an old story, and is apt to be rebuked by people who think that an event which happened the day before yesterday is ancient history. Most people are inclined to say as did Richard Brinsley Sheridan: "Our retrospection will be all to the future." In giving up news writing for a day each year to prepare this review I always think of the story of the fellow who went down to Arizona for his health. He turned to painting as a profession and was showing one of his attempts to a visitor from back home.

"And did you do this, John," the visitor said.

"Yes," proudly said the tyro in art, "I did."

"Well, then, for heaven's sake, 'Go back to drink. You were a success at that.'"

ALL RECORDS SMASHED

Going back over the pages of the JOURNAL for the two volumes of 1924, many important items of interest are to be noted in the record of the year's news. It is seen that the electric railways smashed all records in 1923. Figures show that more passengers were carried, more cars operated and more car-miles amassed during the year than for any other similar period. Moreover, revenues were the greatest in the history of the industry. The census figures for 1922, made public in February, 1924, showed that 15,331,401,801 passengers were carried in 1922 as opposed to 14,506,914,573 in 1917. Railway operating revenue

was up from \$925,477,405 as opposed to \$650,149,860 in 1917. For 1921 out of 458 electric railways reporting to the Treasury Department 211 paid income taxes of \$3,276,532 on net income of \$33,843,158.

The JOURNAL estimated in its issue of Jan. 5 last year that \$262,000,000 would be spent during the year for new plant and equipment and maintenance materials. As if this were not enough the JOURNAL proved that electric railway costs were approaching a stabilized condition. As the stenographer wrote it receiverships were the slowest in 13 years. Slowest and lowest is right, Gertrude. More cars were ordered during 1923 than in any year since 1913, and track extension and reconstruction were the greatest in 8 years. In April along came W. H. Sawyer, president of the East St. Louis & Suburban Railway, with his optimistic paper before the Wisconsin Public Utilities Association. His remarks were truly constructive. Later on B. C. Cobb, vice-president of Hodenpyl, Hardy & Company, told how growing traffic and ample rates were helping the situation. Mr. Cobb was speaking before the Babson Institute.

James W. Welsh, executive secretary of the American Electric Railway Association, told the members of the Southwestern Public Service Association why car fares differ. He said that the speech of electric railway men was an unknown language to the car rider. Speed, wages, length of haul, density and investment all affect fares. Any one of these factors alone could more than account for existing variations in fare, but combined the wonder is not that fares range only from 5 to 10 cents, but that they do not reach far, wider limits. His paper was a very valuable contribution to the subject and it was later used to good advantage in a number of places.

Let anybody who still thinks the electric railways are going to the demnition bow-wows remember that

the receiver at St. Louis has piled up \$4,000,000 in cash and that in Kansas City an annual deficit of \$1,500,000 has been turned into a net of more than half a million. The Louisville Railway is back on a dividend-paying basis and the Brooklyn-Manhattan Transit Corporation began preferred dividend payments less than a year after its reorganization.

These are particularly juicy morsels, but they are fairly typical just the same. The Denver valuation was fixed at \$23,514,769 and an 8-cent fare authorized. This is a heartening instance that fair play is assured. The special master's findings were questioned in the Denver case, but the court did not depart far from them. Along the lines of improvement in the industry, substantially better results were reported in New York City. The combined results there for the year ended June 30, 1923, show a surplus for the first time in five years; 2,577,912,855 cash fares were paid. The traffic in the city was 439 rides per capita. Invested in the rapid transit lines of New York is the vast sum of \$479,000,000.

Another important development was the one in which the New York commission held that a fare advance was the only answer to the New York & Queens County Railway situation where the company was operating at a 5-cent fare and burdened with a \$250,000 paving expense. In this decision the commission recognized the basic fact that, regardless of politics and politicians, the public cannot continue indefinitely to get something for nothing. Permission was granted to charge 6 cents with 1 cent additional for each \$100,000 paving assessment against the company.

MUCH FROM LITTLE

It has been very largely a case of *multum in parvo* with the electric railways in recent years. Just how much can be done with little is shown in most of the cases in the competi-

tion for the Coffin prize, won in 1924 by the Northern Texas Traction Company. This award is made to the electric railway which during the year has made the greatest contribution toward increasing the advantages of electric transportation for the convenience and well being of the public and for the benefit of the industry.

P. L. Thomson, publicity manager of the Western Electric Company, is of the opinion that "It's your own fault" if the railways are not better sold to the public. Mr. Thomson said that he could not attempt to set up a figure that would express the ratio the advertising appropriation ought to be to the gross revenue, but that railway men ought to spend enough to do the job. Three hundred street railways spent \$2,000,000 last year in public relations activity. It will be more this year. He said that when a railway sets apart as one of the major objectives of its business the building of sound public relations, the executive officer in charge ought to be at least a vice-president and he ought to have competent assistants and an adequate appropriation. Similarly, Bill Strandborg of the Portland Electric Power Company, speaking before the Inland Daily Press Association, said that the way for the utilities to tell their story was to buy more space in the advertising section of the newspaper, not to beg space in the news columns.

H. G. Taylor, president of the National Association of Public Utility Commissioners and a member of the Nebraska State Railway Commission, said that anything is possible when we have to do it. Mr. Taylor said that the working of economic laws, superior efficiency in the use of the streets, intelligent sales efforts, and good use of publicity is bringing the electric railways back into their own.

OTHER CONTRIBUTIONS BY MR. WICKWIRE

One of the best contributions to this subject was the paper "Friendlyizing the Public," read by E. F. Wickwire, vice-president of the Ohio Brass Company, before the Southwest Association in April. This was a typical Wickwire contribution. Mr. Wickwire said that the utilities would be poor picking for pilferers if all directly interested would do their part. In a similarly striking way, Mr. Wickwire drove home the importance of public relations work

and showed how to pursue it in addresses before the new Metropolitan Community Section of A.E.R.A., New York, and before the Midwest Electric Railway Association. In April Traction Tom, a new figure in the electric railway industry, was introduced as the outgrowth of the poster series called "The Man Behind the Electric Railways." Traction Tom, speaking for the 500,000 workers in the United States who draw pay directly or indirectly from the electric railways, has given out some homely advice.

Early in the year the Pittsburgh Railways ushered in its commercial and research department, sponsored by Thomas Fitzgerald and headed by W. H. Boyce as commercial manager. New cars have been ordered for Pittsburgh, but immediate action toward bettering public relations was begun by changing fares and improving service conditions. Later Mr. Boyce told what may be accomplished by constructive publicity. As Bill indicated, even if it is street railway publicity, it is in direct competition with the advertising of Rears-Sawbuck, the United States Mail, the Well Telephone Company, jitneys, freight and passenger buses, trucks, about fourteen million autos and Fords and the Shoe leather express. Pittsburgh has put on the Sunday pass with good effect. The "Shop Between Ten and Four" signs distributed through the association have helped to remove some of the terrors of the holiday season. By keeping everlastingly at it, railway men may eventually be able to make meaningless the lines:

*The melancholy days have come
The saddest of the year
The Christmas shopping women folks
Begin to reappear.*

In New York the Third Avenue Railway has installed its own radio broadcasting station WEBJ. On the air Slaughter Huff, president of the company, had been known to follow Mayor Hylan speaking from WNYC. It is the battle of the air or

*From Slaughter Huff to Singhi Breen
From president to singing queen
The Mayor may gulp and at times be
rough
But he doesn't bother Slaughter Huff
Or G. M. Dahl for that matter.*

Edward Dana of the Boston Elevated has used the radio to good advantage during the year. In Detroit it is being used to call emergency crews.

Traffic is being speeded up in downtown St. Louis by the enforce-

ment of recent ordinances. Signs installed in the cars of the Pittsburgh Railways tell strangers how to reach their destination by railway. The Tri-City Railway put into effect a rerouting scheme.

It's a courtesy desk now on the Chicago Surface Lines, not a complaint desk. The change was suggested by the official who reads the letters received daily from passengers. He found that a constantly increasing number of them began "I wish to commend." The honor system of fare collections has speeded up passenger movement on the Beaver Valley Line and bettered public relations. Freight and passenger cars of the Indiana, Columbus & Eastern Traction Company and the Columbus, Newark & Zanesville Electric Railway have been converted into moving billboards. Cars similarly painted are being run by the Northern Ohio Traction & Light Company. Unusual terminal layout facilities at Salt Lake City on the lines of the Bamberger Electric Railroad and the Salt Lake & Utah Railroad are builders of good will. Passenger comfort is a feature of the new Chicago Rapid Transit Company cars, discussed in detail in the issue of the JOURNAL for Jan. 12. As Britton I. Budd, then president of the American Electric Railway Association and head of the Chicago Elevated, said on "Modernization," in the annual convention number:

"Public good will is the key to successful operation of a utility company. Good service is the basis of public good will."

Many of those who spoke during the year about public relations properly stressed the importance of the attitude of the employee as a point of contact. He needs all the tact of the fellow with the red nose who suggested a way out in a dispute between two ladies over the car window.

"If this window is open," one declared, "I shall catch cold and probably die."

"If the window is shut," said the other, "I shall certainly suffocate."

The two glanced at each other. Then the man with the red nose said:

"First, open the window, conductor. That will kill one. Next, shut it. That will kill the other. Then we can have peace."

Members of the New England Street Railway Club discussed employee relations at the meeting held in Boston in December. The Nashville Railway & Light Com-

pany has scored a reduction of 25 per cent in the number of accidents since its adoption of the plan whereby trainmen profit by accident reduction. In Birmingham bonus awards and distinguished service buttons have resulted in more careful operation and fewer accidents. The Virginia Railway & Power Company was another to adopt an arrangement of this kind last year.

The subject "Modernizing Employment Methods" was discussed by Dr. A. J. Snow, in the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 13. His talk was based on experience on many different lines of industry. He said that general interviews and general examinations do not give any indication of the probable reaction of a man when operating vehicles under traffic conditions. Similarly, with respect to bus operation, R. N. Graham, manager of railways of the Pennsylvania-Ohio Electric Company, said care in selecting drivers is better than education after employment.

Trainmen are not the only employees that need to be coached. W. A. Holden, superintendent of transportation of the San Antonio Public Service Company, speaking before the Southwestern Association in April, said that the supervisory force, particularly inspectors, needed to be trained. They can do more than most anybody else to improve the service. Andrew L. McDonald, member of the Wisconsin Railroad Commission, speaking before the Wisconsin Association, said that trainmen cannot make up for defects in service for which the management is responsible.

S. F. Fannon, director of the department of public service of Sherman Service, Inc., said that maintaining street railway personnel depended on explaining the company's purpose to employees and the relation of the individual to the railway.

The Cleveland men were granted a 12-cent advance by an arbitration award made in June, but the company said that the finding was not fair because of prejudice on the part of one of the members of the board. In December the men voted down an offer made by President Stanley as a means of settling all differences between the company and the union. He wanted a 5-year contract on a 60-63-65 cent basis with the present differentials. There the matter stood on Dec. 31. The Detroit Municipal Railway last May decided not

to deal with the union and this matter is still before the courts for adjudication. A three-day strike in Pittsburgh was terminated on May 12 when trainmen accepted the present wage scale for two years. Four hundred miles of I. T. S. Interurban were tied up six days in December. The company accepted the closed shop, but there will be no hourly wage increase. Some of the Buffalo labor dynamiters were sent to the cooler, but the last has not yet been heard about the fate of these miscreants. Arbitrations have favored neither party, as pointed out in the compilation of arbitrations during the last five years.

INTERURBANS ARE MODERNIZING

The Interstate Public Service Company placed sleeping cars in service between Indianapolis and Louisville this fall, and the same company made rider comfort the feature of the new interurban car which it developed for intercity traffic. Similarly, a parlor car and coach built by the Milwaukee Electric Railway & Light Company have many features typical of steam railroad practice. The demand for a de luxe service has also increased in Michigan so that the Detroit United Railway has added chair cars to several of its interurban lines. And the Northern Ohio Traction & Light Company and the I. T. S. have given increased attention to the matter of passenger comfort.

The progress made in handling interurban freight in 1923 was discussed by T. H. Stoffel of the railway department of the Westinghouse Electric & Manufacturing Company early in the year. He said that in three central states material additions had been made to net revenue by handling freight. In those states alone more than 1,000 cars are now in use and loadings approximate 500 carloads. The new Indianapolis freight terminal was opened last fall. This is the largest terminal of its kind in the world. The Indianapolis & Cincinnati Traction line was changed from a.c. to d.c. and generally rehabilitated as a step looking toward extension of the line some 60 miles to reach Cincinnati.

There was "Jolla-fication" at the completion of the San Diego Electric Railway extension and the opening of the 14-mile high-speed line to Ocean Beach last July. The Chicago, North Shore & Milwaukee Railroad reported its best year in 1923. The Toledo & Western Railroad was

sold to the Willys-Overland Automobile Company and the Wabash Railroad. This marked the entrance of another motor manufacturer into the field of railroading.

C. W. Snyder, vice-president of the Illinois Power & Light Corporation, appears to have summarized the interurban situation in his paper last November before the Midwest Association. He said that the interurban must introduce new services and new selling. He said that the passing out of some of the smaller and weaker roads had created a false impression about the status of the electric railway. He attributed these failures to the natural reaction from a boom building period in which some roads were built that were not justified by density of population or conditions of competition.

BUS DEVELOPMENT GOING ON APACE

All of which leads to the subject of the bus. J. A. Emery of Ford, Bacon & Davis said early in the year that co-ordinated service between trolley and bus was possible and then proceeded to prove it. Later in the year John A. Beeler contrasted coach and bus operation in New York as conducted by the Fifth Avenue Coach Company and by the buses under municipal supervision. Before the New York Electric Railway Association at Long Beach in June L. H. Palmer, general manager of the United Railways & Electric Company, Baltimore, told about the operation of the bus there as an auxiliary covering more than 5 years. The spheres of motor and railway transport were discussed at the New England conference in December. Among the electric railway men who participated with papers were W. J. Flickinger, assistant to the president, the Connecticut Company; Edward Dana, general manager Boston Elevated Railway, and L. S. Storrs, president the Connecticut Company. At that meeting the expression *Cave Canem* was resurrected by Mr. Dana. His translation of this was "Beware of the Dog." He offered this motto for consideration of the bus men as the inscription over the door of the electric railway: "Beware of the bus-mile statistics."

With Mr. Dana it has evidently been a case of:

*My auto, 'tis of thee
Short cut to poverty—
Of thee I chant.*

But they are all doing it. Earlier in the year F. E. Belleville, auditor of the Louisville Railway, sang a

mean about the results of bus operation there. As for operating experience with buses, B. Hilburn, general manager of the Tulsa Street Railway, pointed out various sources of trouble in his paper before the Midwest Association in November. The Twin City Rapid Transit Company bought out its motor competitors. The United Railways, St. Louis, likewise took the bull by the horns, as it were, and entered the bus field in competition with the People's Motor Bus Company. The largest bus operator among railways is the Public Service Railway with 593 buses.

The Detroit United bought some rural bus lines. It will also operate to downtown Detroit by bus instead of bringing its interurbans into the city. Similarly the Hartford & Springfield Street Railway turned the bus to advantage. Rochester went in for a trackless trolley, as did Cohoes and one or two other places. But Rochester did even more—it established de luxe bus service on a suburban run. Buses are even being run along the historic Paul Revere route. The Department of Street Railways of Detroit developed a new double-deck bus and is running emergency bus lines as a municipal enterprise. The bus was made an ally in Decatur. In Pennsylvania the Pennsylvania-Ohio Electric Company has paralleled its interurban line with buses as a means of providing de luxe service. As a matter of fact, buses are now carrying one-quarter of the total number of passengers in Youngstown. There bus service supplements the city service by furnishing transportation facilities to the recently developed sections.

Both the Los Angeles Motor Bus Company, subsidiary of the Los Angeles Railway Corporation, and the Pacific Electric Railway ordered more double-deck buses during the year and expanded their bus services. The Michigan Railroad joined with the bus so as to increase freight and passenger facilities. Bus talk was started in Cleveland last March and wound up in the hearing at Columbus in December, at which some harsh words were passed. There has also been a lot of loose bus talk in New York. In fact, there were so many applicants for bus rights in New York at one time that track of them was lost. One count showed 51 applicants. New York's merchants, however, are not impressed with the idle talk on the part of the Mayor

of taking the cars off both 42d and 125th Streets and replacing them with buses.

200 BUSES FOR PHILADELPHIA

By far the biggest bus order of the year is the one placed by the Philadelphia Rapid Transit Company for 200 gasoline-electric vehicles. In a lecture under the Cyrus Fogg Bracket Foundation to the students of the Green Engineering School of Princeton University, President Thomas N. McCarter of the Public Service Railway said that the electric railway and bus in co-ordination can furnish the people of this country with local transportation fitted to public needs, and the transportation system of the future will be a combination of cars and buses under the same management, each occupying the field to which it is best suited. A similar plea was made by President Shannahan of the American Electric Railway Association before the National Association of Railway & Utility Commissioners at Phoenix in November. He wants legislation which will set the motor vehicle in its proper place, on its own account and in relation to other means of transportation, as a common carrier, and on a footing with street car transportation in so far as franchises, penalties and restrictions are concerned. Co-ordination was the subject of a series of papers at the convention in Atlantic City.

JITNEYS A POOR STICK FOR SUPPORT

In a number of cases the politicians have found the bus to be a convenient plaything. Mayor Hylan has, of course, been spouting the cause of the bus all through the year. Mayor Rybolt of Akron stole a note from the ideas of Mayor Hylan, but with disastrous results. Service was suspended in Akron on Feb. 1. The local cars were withdrawn at the expiration of the franchise following the refusal of city officials to grant a fare increase pending negotiations of the new operating contract. As the JOURNAL said at the time, Akron's ride on rubber was not resilient. The cars went back on Feb. 28. Following the suspension of railway service in Akron, the jitney men promptly appealed to the city for permission to charge a 7-cent fare, saying that they could not make expenses at 5 cents.

The jitneys were defeated at the election held on April 29 in Youngstown, Ohio. At that time the so-called jitney referendum ordinance

initiated by the jitney operators was voted down. Jitneys were made a political issue at Springfield, Mass., and counsel for the jitney men ran for Mayor on an avowed platform providing for their return. He was defeated. The jitney was also an issue in the election at Springfield, Ill., on Nov. 2, but there a new railway franchise for 20 years was awarded to the Springfield Power Company under which service will be co-ordinated. There was a five-day service suspension in Port Huron, Mich., by the City Electric Railway, a subsidiary of the Detroit United Railway, in which the residents rode buses at a 10-cent fare while the City Commissioners made up their minds to accept the railway's proposal. At the election on Sept. 9 the voters confirmed the good judgment of the City Commissioners. The choice before them was: Do you prefer one-man car operation at 5 cents or two-man operation at 7 cents? The jitney ordinance of Detroit was declared unconstitutional. In this instance the court made permanent the injunction restraining the city and its officers from enforcing the ordinance. The court opinion stated that the ordinance was unreasonable from the viewpoint of public demand and general welfare in excluding jitneys from the main streets and allowing other forms of transportation to use them, and that it was not a regulation but a prohibition of jitney service which is inconsistent in view of the license granted by the ordinance. The Detroit lines were not required to retire, but out in Oakland "Rosalie" retired. Rosalie was the bus put on by the city of Oakland. She was incarcerated in the police garage to await further developments in Oakland. The retirement of "Rosalie" was forced by the refusal of the city auditor to pay the bill for her.

Expansion of the San Francisco Municipal System put the railway behind \$317,929 for the year. Seattle flirted with the 5-cent fare with the result that the net income was \$600,000 less than for the previous year. Chairman Jackson of the Board of Public Trustees in charge of the Boston Elevated believes the railway will go from public control to public ownership. Boston's Mayor welcomes this suggestion. The finding of the board of arbitrators, appointed in accordance with the purchase contract between the city of Detroit and the Detroit United Railway, when the city took

over the Detroit United lines, was a most important finding.

Heavy electric traction was the subject of a discussion at the mid-winter convention of the American Institute of Electrical Engineers held in Philadelphia on Feb. 5. It was also a subject at the A. S. M. E. meeting in June. Again at the A. R. A. meeting in July the problems of heavy traction held a prominent place. In June the New Haven Railroad started 100 per cent electric operation between New York and New Haven, the use of steam engines being eliminated in the electrified zone. The Pennsylvania made a decision to equip its Fort Washington branch for single-phase operation. Mr. Ford's locomotives for use on his Detroit & Ironton Railroad are coming on. The Staten Island lines are being electrified.

MUCH DIRT, BUT NO DIGGING

Akin to heavy electric traction is rapid transit operation in cities. At the election in Detroit on Sept. 9 the voters approved a charter amendment providing for a system of rapid transit lines. A combination tube and subway is planned to connect San Francisco and Alameda. Hylan has a subway plan for New York to cost \$400,000,000, but in the meantime he has spurned all overtures made by the Transit Commission looking toward even the completion of lines authorized in 1913. Plans have also been advanced during the year by Daniel L. Turner for a New York suburban transit system by which railway trains would run into New York through a union terminal distributing system, to be entirely independent of the city systems. Another Hylan idea is for a four-track trunk line to be built on Sixth Avenue to replace the "L" now there. There has been much dirt but no digging in New York. A wag who wrote to the Transit Commission expressed the situation thus:

*For seven long years Hylan's dinned
in our ears
What he'd do if he ever got going,
But the subways we'd get are not
started yet
In spite of the "dirt" he's been
throwing.*

At the hearing on Dec. 24 before Judge McAvoy on transit matters Mayor Hylan complained that he was being made defendant instead of prosecuting witness.

The question of rapid transit for Chicago has been reopened by proposals from the railways considered by Mayor Dever, Mr. Blair, Mr.

Insull and other officers of the companies there. Super-highways are proposed for Detroit with four-track rapid transit lines underneath them. Hollywood is to be made accessible to Los Angeles through a tunnel to be built at an outlay of \$3,800,000 by the Pacific Electric Railway. Perhaps the Pacific Electric Railway will be able to lay out the subway for moving picture purposes. The year 1923 saw "Conductor 1492" in the movies and the subject of a JOURNAL editorial, "Caught Underground," may yet be enacted. John A. Beeler wants Atlanta to put in a moving sidewalk.

Even without rapid transit lines street car traffic is being speeded up. A gain of 1.85 m.p.h. in the downtown district of Detroit has been obtained largely through anti-parking regulations. At the same time accidents have been reduced. Chicago's Loop rerouting was planned so as to increase the capacity for cars 30 per cent. Parking rules were suggested by the New York State Conference of Mayors to fix drastic limits on trolley-traveled streets. Street congestion was one of the topics at the meeting of the Mid-West Association in November. Substitution of the bus for the trolley would add to traffic congestion, said John A. Miller, Jr., associate editor of the JOURNAL, in discussing a paper presented before the A. S. C. E. Along the lines of public safety, rules for pedestrians and changes of car routes were proposed in the traffic report presented in Baltimore. The Mayor's commission there recommended strict anti-parking regulations within the central business district. J. Rowland Bibbins told in the JOURNAL for Feb. 23 how the work of solving the traffic problem was being organized in some cities and gave some of the results. He said that a broader viewpoint of the whole problem was necessary. The greatest need is for leadership and the railway should supply it.

The biggest thing of the year done in the interest of relief of street and highway accidents was the national conference called by Secretary of Commerce Hoover. This conference outlined a comprehensive and constructive set of rules and regulations for guidance of all interested parties.

The doctrine of "Modernize and Merchandise" is certainly bearing fruit. Details of some of the advances that have been made have already been noted. Although, as the

JOURNAL pointed out last March, 40 per cent of the machine tools in use in electric railway shops were 20 years old and only 28 per cent of all machine tools now in use have been purchased in the last 10 years, during the year some progress was noted in correcting this condition.

The new Everett shops at Boston have paved the way to maintenance economy. The Interborough has completed a new inspection shed at 180th Street, New York. New buildings are to replace the carhouse destroyed by fire last July at Grand Rapids. Detroit has recently completed new shops for its municipal line. At Toronto there are 5 acres of shop under one roof to care for cars of the municipal railway. This building is the principal one of a group so designed as to involve the minimum movement of equipment, materials and men. The arrangement provides for about 1,800 cars, including all branches of work necessary for overhauling and painting. Fort Wayne has a new carhouse.

FOREIGN OPERATION STUDIED

Forty-seven pages of the issue of the JOURNAL for Sept. 20 were given over to the report of the committee on foreign operation, made up of James W. Welsh, Harley A. Johnson and Harry L. Brown. It was a prodigious task which these men carried out. Their itinerary and the report which they presented prove this. Not only are the results of the study which the members of this committee made available in the JOURNAL, but the findings have been reprinted in pamphlet form. Aside from the elaborate report on foreign practice the JOURNAL covered at length the sessions in Paris in June and in Hamburg in September of the two principal European electric railway associations and published most of the papers and reports presented at these meetings. Nearly every week "Foreign News" appeared in the department "The News of the Industry."

Reference to the report of the committee that went abroad and to the convention at Atlantic City and the exhibits was purposely left to the last. In news reporting the big event comes first, but in a review there is little need to draw attention to things that have made such a big impression themselves that they can't possibly escape attention. It is very much like the case of the fellow who was asked if he knew that the 'Steenth National Bank had busted. "Yes," he said, "I heard the report."

Heavy Traction Has Quiet Year

Progress Is Being Made on Projects Already Started, but Little New Work Is Decided On—New Type of Single-Phase Locomotives Planned

CONDITIONS in the field of heavy electric traction have changed comparatively little during the past year. The outstanding event of the year probably was the electrification meeting of the American Institute of Electrical Engineers held at Philadelphia in February. Operating men from the principal steam railroads having electric divisions, and some few from other roads, expressed their views of what is to be expected from electric operation if it is to become interesting to the trunk lines. The discussion brought out that on the electrified division of the Norfolk & Western Railway extremely heavy freight trains are hauled by electric locomotives with an 8 per cent operating saving over steam for doing the same amount of work. Moreover, the electric locomotives can haul trains at twice the speed of the steam engines and are available for service for 85 per cent of the time as compared with 50 per cent of the time for steam engines. There is a fuel saving of 12 per cent over steam, and with favorable conditions it is estimated that the fuel saving should run as high as 25 to 30 per cent.

In connection with the A.I.E.E. meeting, the Pennsylvania Railroad had an interesting exhibit of its heaviest types of motive power, both steam and electric. It is interesting to note that what is said to be the heaviest locomotive in the world for freight service is an electric engine, weighing 250 tons and having a rating of 4,800 hp. This machine operates on the single-phase system at 11,000 volts.

MOTOR-GENERATOR LOCOMOTIVES FOR SINGLE-PHASE LINES A RADICAL DEPARTURE

A somewhat revolutionary announcement during the year was that of the New York, New Haven & Hartford Railroad that it has ordered seven electric locomotives of an entirely new type from the General Electric Company. These locomotives will operate on the railway's 11,000-volt, single-phase system, but, unlike the other locomotives of the New Haven, they will have motor-generator conversion equipment to change the alternating to direct current for use in d.c. traction motors. While the plan is patterned after the Ward-Leonard system brought out 30 years ago, this is one of the first installations where it is employed in actual service on a large scale.

The New Haven announcement followed only a short time after the statement that the electric locomotives for Henry Ford's road, the Detroit & Ironton, will use locomotives of nearly similar electrical characteristics to those ordered for the New Haven, although the contact line will be at 22,000 volts on the Detroit & Ironton. These locomotives will be designed by Mr. Ford's engineers and will represent his ideas. The electrical equipment will be furnished by the Westinghouse Electric & Manufacturing Company. Thus both leading electrical manufacturers are constructing locomotives of a new type different from anything else in America, but which will be quite similar electrically.

The New Haven and Ford announcements indicate that the railroad men and the manufacturers are taking a more liberal attitude than they have for a number of years past. While it will be some time before service

records of these new locomotives will be available for comparison, it seems that the situation is now clearing up. Consequently a considerable impetus should be given to the cause of electrification.

During the year the New Haven road inaugurated 100 per cent electric operation of all freight and passenger trains on its main line between New York and New Haven. While this line has been electrically operated for several years, until last year there never was sufficient power to permit full electric operation, and steam was used for certain passenger and freight trains.

CONSTRUCTION WORK ON SEVERAL ELECTRIFICATIONS IS PROGRESSING

The Long Island Railroad began work on its Jamaica-Babylon electrification during the year. This project comprises 28 miles of line and will cost \$4,000,000. It will convert one of the largest remaining sections of the system to electric operation. It permits the road to run through passenger trains between Babylon and the Pennsylvania station in New York, or Flatbush Avenue in Brooklyn, thereby eliminating the transfer of passengers at Jamaica.

The Pennsylvania Railroad extended its 11,000-volt, single-phase electrification in the Philadelphia suburban zone by converting the Fort Washington branch to electric service. This is a 6-mile line connecting with the Chestnut Hill branch.

Construction is progressing on the electrification of the Staten Island Rapid Transit lines, with some 40 miles of track. These lines eventually will be connected with the rapid transit system of New York City to give the Borough of Richmond a high-class suburban service.

Work on the electrification of the Virginian Railway has progressed during the year, and it is expected that the road will be opened for electric service during 1925. The Illinois Central suburban electrification at Chicago also is proceeding according to plans announced a year ago.

An electrification of an entirely different kind inaugurated during the year was that of the Missouri-Kansas-Texas Railroad between Dallas and Denton, Tex. This line has been equipped with an overhead trolley and the necessary 600-volt d.c. power supply. It is planned to operate passenger service in the same manner as on light interurban roads, and with light one-man cars. Through passenger and freight service will still be given by steam trains. In this way the advantages of the ordinary interurban will be obtained without the duplication of track and consequent destructive competition.

In Europe greater progress is being made in electric traction than in this country. The Swiss Federal Railways will be completely electrified in the near future. The decision to make the change is based on economic reasons, the price of coal being high while water power is cheap. The Paris-Lyons-Mediterranean Railway in France is following through an extensive electrification program that involves most of its lines in southern France. Here, too, much of the power will be supplied with hydro-electric stations.

The Southern Railway of England, which includes a number of the suburban lines operating out of London, is proceeding with its electrification, having increased the electrified route-miles from 85 to 145 and the track-miles from 248 to 358.

Electric Railway Costs and Fares in 1924

Trend Figures Indicate a Closer Approach to Stabilization—Recession in General Construction Costs and Cost of Railway Operating Materials—Advances in Railway Wages and Fares—Discussion of Trend of Operating Costs

By *Albert S. Richey*

Electric Railway Engineer, Worcester, Massachusetts

WITH this issue the *ELECTRIC RAILWAY JOURNAL* again presents a chart and tabulation showing the trends since 1913 of five index numbers which are of some interest to electric railway operators and investors. These five indexes, of wholesale commodity prices, general construction costs, street railway operating material costs, street railway wages and street railway fares, are each on the base of 1913 = 100, and are among the twelve which comprise the *Conspectus of Indexes* compiled monthly by the writer and published regularly in the *Financial and Corporate* section of this paper. Similar charts were published in the *Annual Statistical Numbers* dated Jan. 6, 1923, and Jan. 5, 1924. In the current presentation the indexes have been revised and brought down to date. The average indexes for the years 1913 to 1920 inclusive, are shown in the table, with the monthly indexes from January, 1920, to date. Monthly indexes for the earlier years are included in the table in the 1924 Statistical Issue of the *JOURNAL*.

The methods of obtaining these indexes were described in the article accompanying the chart in the Jan. 6, 1923, issue, and these methods are still followed with one exception, that of the wage index. As noted on page 787 of the *ELECTRIC RAILWAY JOURNAL* for Nov. 1, 1924, the wage index has been revised by a change in the weighting used. Formerly, the maximum hourly wages of the platform men on about 100 of the larger roads of the country were weighted according to the number of passenger cars operated by the various companies. The revised index, as shown here, uses for weighting purposes the number of platform men employed, and is thus a more accurate indication of the trend of the average platform man's hourly rate of wage. The difference between the former and the revised index is very slight, owing to the necessarily fairly close relationship between the number of cars and the number of men on roads operating 100 or more cars.

In the *JOURNAL*'s 1924 Statistical Issue, it was stated that these indexes then indicated that electric railway costs were approaching stabilization, at least to the extent that an end could be seen to the period of rapid and large fluctuations in labor and material prices. Especially as compared with the several years preceding 1923, that statement is borne out with reference to 1924, although the year just past shows a trend which is downward in two of the indexes and slightly upward in two others. Apparently we should not yet risk any very definite prophecies with respect to the future general trend of these costs and prices.

Wholesale prices of all commodities combined, as shown by the Index of the U. S. Bureau of Labor Statistics, fluctuated less during 1924 than in the preceding year, and ended the year at almost the same level as it entered. In 1923 the maximum of this index was 159 and the minimum 150, as against 152.7 and 144.6, respectively, for 1924. These are small fluctuations com-

pared with the rapid drop of more than 100 points from 247, the peak in May, 1920, to 145 a year later in May, 1921, or as compared with the rise of 17 points from the post-war minimum of 138 in January, 1922, to 155, six months later in July of the same year. Within the last 18 months this authoritative index of the general commodity price level has moved less than six points above or below 150, or 50 per cent above the 1913 or pre-war level. Many students of the subject have ventured to call this the stabilization point, and the experience of the year 1924 tends to confirm that opinion.

The general Construction Cost Index of the *Engineering News-Record* remained almost stationary near 220 for a year from June, 1923, through May, 1924. This was about the midpoint between the peak maximum of 273.80 in June, 1920, and the post-war minimum of 162.04 in March, 1922. After May, 1924, however, this index showed a continuing drop, reaching a minimum of 205.70 on Nov. 1, but increasing to 208.58 on Dec. 1.

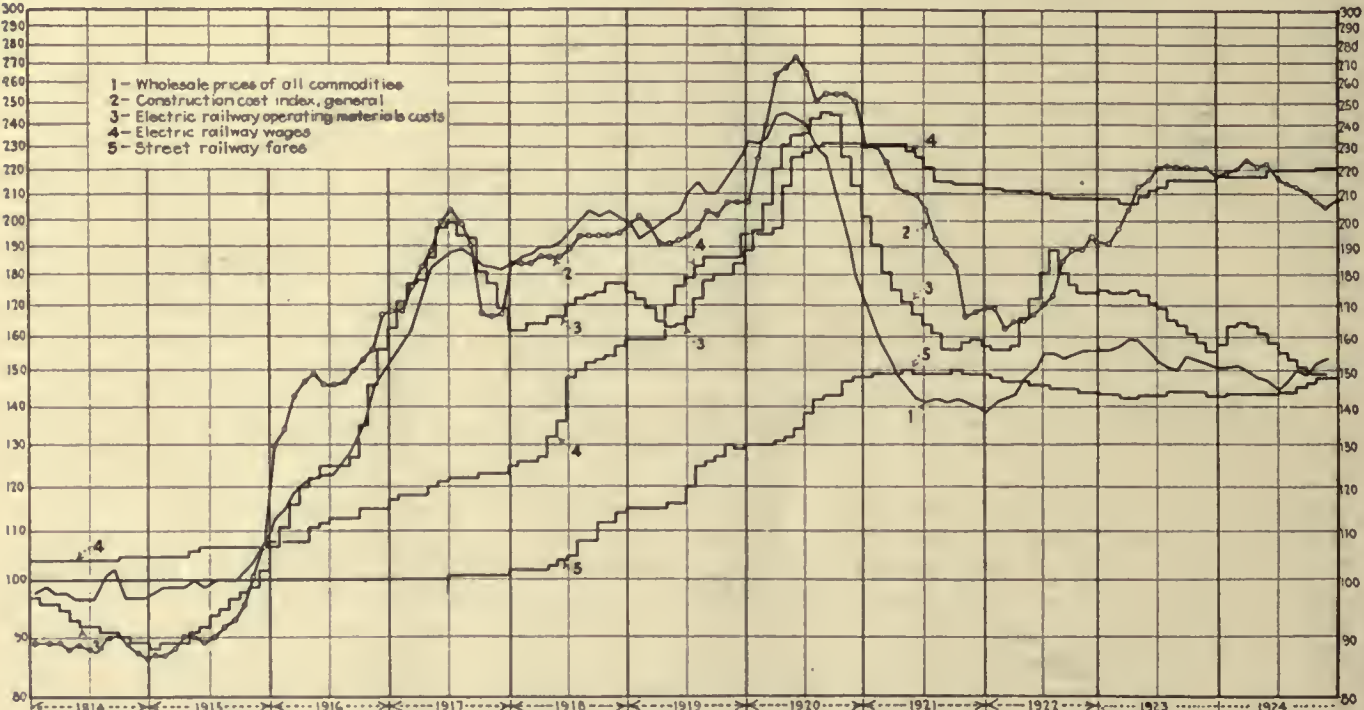
The Street Railway Operating Materials Cost Index, which showed a drop of twenty points, or more than 11 per cent, in 1923, came through 1924 with a total fluctuation of less than sixteen points, or about 10 per cent, and a further net drop of seven points, or less than 5 per cent. It reached its low point since the war, 148.5, in October, standing a little lower than the general commodity price level, where it is possible it may establish itself for some time to come. This index is not one of construction costs, but is intended to apply to materials used in electric railway maintenance and operation. It does not include any labor costs which make up so large a part of the first cost of railway construction. The index does include fuel cost, at a weighting of 40 per cent of the total. While many railways purchase power, most power contracts include a coal clause which varies the price of power with the cost of coal, and it is for this reason that the cost of fuel for power is included in the index, which may therefore be taken as an index of the cost of operating materials including power cost, when the latter is purchased under a coal clause. The remaining 60 per cent of the weighting of the materials index is made up of the costs of metals, metal products, lumber and building materials. The weighting of these individual items was determined upon after a careful study of the cost of materials used by a number of railway companies in various parts of the country over a period of years.

The Index of Street Railway Wages, weighted as described above, has been rising steadily since its post-war low of 206.8 in March, 1923, reaching 216.4 at the end of 1923 and 220.8 at the end of 1924. The gain during 1924 was due in a large measure to wage increases in Massachusetts, Connecticut, Rhode Island, Chicago, Philadelphia and Buffalo. As those companies employ nearly 25 per cent of the trainmen represented

in the weighting of the index, it is not suprising that increases of from 2 to 10 cents per hour in those few companies should cause a rise of 2 per cent in the wage index. With but few exceptions other than those noted above, street railway wage contracts were renewed during 1924 at rates the same as or lower than the 1923 scales.

The Street Railway Fares Index has increased somewhat during the past year, with very few individual fare decreases, and some more or less important increases, including Baltimore, Indianapolis, Cincinnati, Des Moines, Springfield, Mass., Boston and Akron. The net change in the Richey Index was from 142.4 to 148.1, or an increase of about 4 per cent. The multiplying factor between the Richey Fare Index and the average

fare in cents being 0.048425, it will be noted that the average city fare increased during the year from 6.89 cents to 7.17 cents. Here again it should be remembered that this index is not a simple average, but that it is weighted in accordance with the population of the various cities included. Those cities include all in the country of 50,000 population or more, except New York City. The fares used are, as nearly as it is possible to determine them, the average in the various cities, including cash and regular ticket or token fares. Ticket or token rates used are those available to all riders at all times of the day; pupils', workmen's or other special forms of tickets are not included. Pass and transfer riders are not included in arriving at the averages, but where a charge is made for a transfer such charge and



	Wholesale Prices, All Commodities (U. S. Bur. Lab. Stat.)	Construction Costs (Eng. News-Rec.)	Elec. Ry. Operating Materials Costs (Richey)	Elec. Railway Wages (Richey)	Street Railway Fares (Richey)		Wholesale Prices, All Commodities (U. S. Bur. Lab. Stat.)	Construction Costs (Eng. News-Rec.)	Elec. Ry. Operating Materials Costs (Richey)	Elec. Railway Wages (Richey)	Street Railway Fares (Richey)
1913.....	100	100	100	100	100	1922	138	168.7	157	212.6	148.6
1914.....	98	88.6	93	104	100	January.....	141	168.7	156	212.6	147.8
1915.....	101	92.6	94	106	100.1	February.....	142	162.0	156	211.9	147.4
1916.....	127	147.4	126	112	100.1	March.....	143	164.7	157	211.9	147.4
1917.....	177	181.2	182	121	100.5	April.....	148	164.6	166	211.5	147.4
1918.....	194	189.2	169	140	106.2	May.....	150	166.6	172	210.8	145.5
1919.....	206	198.4	172	174	120.7	June.....	155	169.7	181	210.2	145.5
1920.....	226	251.3	225	217	137.2	July.....	155	173.4	189	208.3	144.9
						August.....	153	185.0	181	207.8	144.8
						September.....	154	188.6	177	207.8	144.6
						October.....	156	188.6	174	207.5	144.1
						November.....	156	192.6	174	207.7	143.7
						December.....	156	192.6	174	207.7	143.7
1920						1923	156	191.7	175	207.1	143.4
January.....	233	206.6	189	195	129.9	January.....	157	197.4	174	207.1	143.4
February.....	232	225.1	196	195	129.9	February.....	159	205.3	174	206.8	142.4
March.....	234	240.9	207	195	130.2	March.....	159	213.5	175	207.0	142.3
April.....	245	265.2	221	197	131.1	April.....	156	216.7	173	209.0	142.1
May.....	247	268.9	232	213	131.9	May.....	153	220.7	171	212.6	142.9
June.....	243	273.8	236	226	134.0	June.....	151	222.1	169	213.5	142.9
July.....	241	265.7	237	228	138.0	July.....	150	221.5	165	216.2	142.9
August.....	231	252.0	243	231	141.5	August.....	154	221.5	163	216.4	143.4
September.....	226	255.2	247	232	142.6	September.....	153	220.3	161	216.4	143.5
October.....	211	255.2	245	232	143.3	October.....	152	220.9	158	216.4	143.5
November.....	196	255.3	227	232	147.0	November.....	151	217.3	156	216.4	142.4
December.....	179	251.6	213	232	147.5	1924	151	217.9	158	217.4	142.6
1921						January.....	152	220.3	163	217.4	143.1
January.....	170	230.9	202	231.5	148.2	February.....	150	224.7	164	217.5	143.1
February.....	160	230.7	191	231.4	148.6	March.....	148	221.6	163	217.7	143.2
March.....	155	224.3	181	231.4	148.9	April.....	147	222.4	161	217.8	143.5
April.....	148	213.1	175	231.3	149.1	May.....	145	216.8	158	220.0	143.8
May.....	145	210.8	171	228.2	149.6	June.....	147	214.4	155	220.0	144.2
June.....	142	209.8	167	224.6	148.9	July.....	150	213.2	153	220.0	144.3
July.....	141	203.8	164	221.3	149.0	August.....	149	211.2	151	220.1	146.2
August.....	142	193.1	161	215.5	148.7	September.....	152	207.6	149	220.6	147.6
September.....	141	188.3	156	215.1	148.9	October.....	153	205.7	149	220.7	148.0
October.....	142	182.6	156	214.3	149.6	November.....	153	208.6	149	220.8	148.1
November.....	141	166.3	158	214.2	148.9	December.....	153	208.6	149	220.8	148.1
December.....	140	167.8	159	214.0	148.6						

the proportion of original riders paying it are considered in determining the average fare.

TREND OF OPERATING COSTS

In some instances the Richey indexes of operating material costs and of wages have been combined to arrive at a combined index of street railway operating expenses. To do this intelligently, the make-up of the two indexes must be kept in mind. The operating material cost index includes fuel for power; if power be purchased, the item of fuel does not appear in the operating costs as such, but as most power contracts include a coal clause varying the price of power with the cost of coal, the index containing coal costs is applicable to such cases as representing the trend of cost of operating materials plus power. The wage index is based on maximum hourly rates of platform men; if, as is generally the case, other employees' wages vary with those of the platform men, the index is applicable to all wages. A consideration must be made of the trend of that part of the operating expense which is neither wages nor material, such as salaries and other general office expense, advertising, accidents, etc. Sometimes the assumption is made that such "other" expense varies the same as wages and material com-

bined. If a fair present distribution of operating expense is wages 62½ per cent, material 22½ per cent and other expense 15 per cent; if "other" expense varies as wages and material combined, and if the Richey indexes be taken as representative of the trends of wages and material costs, then the 1924 change in average street railway operating costs (exclusive of fixed charges) was as follows:

	Wages	Material	Operating Expense
Index at end of 1923.....	216.4	166.5	200.3
Index at end of 1924.....	220.8	148.7	201.6
Change during 1924.....	*2.0	†4.4	*0.7

*Per cent increase. †Per cent decrease.

Under the assumptions as above, average street railway operating expenses (not including fixed charges) in the United States at the end of 1923 were about double those of 1913; during 1924 they increased 1.3 points, or 0.7 per cent; the 4½ per cent decline in material costs was more than offset by the 2 per cent increase in labor costs.

All of the above is based on average conditions of the country as a whole; in individual sections or cities experience may show somewhat different results. It may be of some value, however, to compare individual experience with nation-wide trends and to determine the causes for such differences as may exist.

Track Extensions

in 1924 Show Big Increase Over 1923

New Electric Railway Mileage Added During the Past Twelve Months Is Greater than for Many Years—Totals of Both City and Interurban Extensions Are Larger—Mileage of Track Rebuilt Is Approximately the Same as in Previous Years—Electrification of Steam Lines Has Continued

MORE miles of electric railway extensions than were made in any other one year since 1918 is the outstanding feature of track statistics for 1924. Approximately 312 miles of new electric railway track was built during the year. Of this amount about 75 per cent was city track and 25 per cent was interurban. In addition to this, 83.39 miles of steam railroad lines were electrified, making a total of nearly 400 miles of new electric trackage. The total of city and interurban extensions of electric railways, track rebuilt, and steam railroad lines electrified was greater than in any other of the last seven years.

At the same time, some 765 miles of track was reconstructed, 180 miles of this being on interurban lines and 585 miles in cities. This figure is slightly less than that for the year 1923, but is larger than that for any other past year. Figures showing the extent of track construction and reconstruction which was done by 243 different electric railway companies in the United States and Canada are given in the accompanying table.

A larger amount of new electric railway mileage was added in the Western states than in any other section of the country. In this district there were 39,098 miles of city extensions and 48,814 miles of interurban exten-

COMPARISON OF TRACK CONSTRUCTION BY YEARS						
Year	No. of Companies	Urban Track	Interurban Track	Electrified Steam Lines	Total	Track Rebuilt
1907	(a)				1,880.00	(a)
1908	157	1,174.5		84.00	1,258.50	(a)
1909	160	774.7		112.40	887.16	(a)
1910	217	1,204.8		192.40	1,397.20	(a)
1911	223	1,105.0		86.50	1,191.50	(a)
1912	171	869.4		80.80	950.20	(a)
1913	181	974.9		119.00	1,093.90	(a)
1914	163	716.5		229.00	946.40	(a)
1915	136	596.0		448.20	1,044.20	(a)
1916	104	115.40	240.90	388.00	744.30	(a)
1917	121	251.10	125.60	66.00	442.70	375.40
1918	80	216.41	97.41	275.70	589.53	155.43
1919	73	110.90	29.67	287.60	428.17	390.64
1920	87	145.69	30.87	8.92	185.48	361.77
1921	78	108.15	38.95	8.08	155.18	615.21
1922	104	126.27	85.11	12.35	223.73	739.70
1923	272	169.61	63.54	26.16	259.31	854.63
1924	243	218.085	93.988	83.39	395.463	764.323

(a) Information not available

SUMMARY OF TRACK CONSTRUCTION FOR 1924						
	New England States	Eastern States	Central States	Southern States	Western States	Grand Total
Track extensions	10	18	33	10	27	112
Miles of urban track.....	11,386	30,191	59,526	14,508	39,098	218,085
Miles of interurban track.....	13,777	11,740	12,780	0,847	48,814	60,300
Total miles built	25,163	41,931	72,306	15,355	87,912	312,073
Track reconstruction	23	52	70	15	40	218
Miles of urban track.....	66,874	161,463	174,207	43,731	113,847	585,506
Miles of interurban track.....	18,827	16,370	90,662	1,000	37,348	146,107
Total miles rebuilt	85,701	177,833	264,869	44,731	153,195	764,323

sions, making a total of 87.912 miles. The central states rank second in point of extensions with 72.306 miles. Canada is not far behind, with 69.406 miles of new electric railway tracks. The Eastern, New England and Southern states then follow in the order named.

In extent of track reconstruction the Central states take first place by a wide margin, with 264.869 miles. Of this, 174.207 miles was city track and 90.662 miles interurban. The Eastern states are a close second in the amount of city track rebuilt, with 161.463 miles, but are far behind on interurban. All sections of the country reported extensive track reconstruction work during the year. In Canada, however, activity along the lines was somewhat less, as only 37.994 miles of track was reconstructed.

One of the most interesting track extensions made during 1924 was the construction of the new Mission Beach line by the San Diego Electric Railway, as de-

scribed in the ELECTRIC RAILWAY JOURNAL, issue of June 14. This involved the addition of nearly 19 miles of track to the system. At the same time about 3 miles of city extensions were made, so that for new track built during 1924 the San Diego Electric Railway stands first among the companies in the country.

In Philadelphia the Philadelphia Rapid Transit Com-

ELECTRIFIED STEAM LINES

	Extensions, Miles
Baltimore & Ohio R.R.	40.00
Norfolk & Western Ry.	7.83
Montreal & Southern Counties Ry.	1.30
New York Central R.R.	0.63
New York, New Haven & Hartford R.R.	0.15
Texas Interurban Ry.	33.48
Total...	83.39

pany added about 11 miles of new track to its system and the Detroit United Railways constructed an almost equal amount. Other important additions were those of

Track Built and Rebuilt During 1924

Name of Railway	Extensions, Miles City Interurban	Rebuilt, Miles City Interurban	Name of Railway	Extensions, Miles City Interurban	Rebuilt, Miles City Interurban
Connecticut			Rochester & Syracuse R.R.		0.50
Connecticut Company.....	0.60	0.039	Schenectady Railway.....		2.10
Danbury & Bethel St. Ry.....		0.25	Third Avenue Ry. System.....	0.145	13.486
Maine			United Traction Co.....		6.663
Androscoggin & Kennebec Ry.....		6.00	Pennsylvania		
Bangor Ry. & Electric Co.....		0.38	Alleghany Valley St. Ry.....		0.60
Biddeford & Saco R.R.....		0.51	Altoona & Logan Valley Elec. Ry.....	0.26	2.09
Cumberland County Pwr. & Lt. Co.		1.68	Bangor-Nazareth Transit Co.....		1.00
Portland-Lewiston Interurban R.R.		0.08	Chambersburg, Greencastle & Waynesboro St. Ry.....		0.30
Massachusetts			Erie Railways.....		0.45
Berkshire St. Railway.....	0.141	1.787	Harrisburg Railways.....	0.52	3.66
Boston Elevated Ry.....	4.34	17.00	Hershey Transit Co.....		15.00
Eastern Mass. Street Ry.....	0.61	9.92	Irwin-Herminia Traction Co.....		0.50
East Taunton St. Ry.....	5.00	0.90	Lackawanna & Wyoming Valley R.R.	0.22	
Holyoke St. Railway.....		0.25	Lehigh Traction Co.....		0.75
Massachusetts Northeastern St. Ry.		3.94	Philadelphia Rapid Transit Co.....	11.412	24.318
Middlesex & Boston St. Ry.....		1.00	Reading Transit & Light Co.....	3.10	3.80
Millford & Uxbridge St. Ry.....		5.00	Seranton Railway.....		2.16
Plymouth & Brockton St. Ry.....		0.19	Shamokin & Mt. Carmel Transit Co.		5.00
Springfield St. Ry.....	0.017	2.00	Southern Cambria Railway.....		0.50
Union Street Ry.....		0.64	Trenton, Bristol & Philadelphia St. Ry.....		0.50
Worcester Consolidated St. Ry.....	0.49	0.11	West Penn. Rys.....		3.01
New Hampshire			Wilkes-Barre & Hazleton Ry.....		0.18
Berlin Street Railway.....		0.18	York Railways.....	0.43	0.13
Chester & Derry R.R.....	7.50		Virginia		
Laconia Street Railway.....		1.00	Danville Traction & Pwr. Co.....		0.47
Manchester Street Railway.....		1.10	Newport News & Hampton Ry.....		0.08
Rhode Island			Virginia Railway & Pwr. Co.....	0.257	2.31
Newport & Providence Railway.....		1.00	West Virginia		
United Electric Railways.....	0.346	2.494	Monongahela, West Penn. Public Service Co.....	0.19	0.56
Vermont			Princeton Power Co.....		2.02
Springfield Railway.....		0.63	Tygart's Valley Traction Co.....		4.00
Total.....	11.386	13.777	Tyler Traction Co.....	11.42	
District of Columbia			Total.....	30.191	11.740
Capital Traction Co.....		0.521	Illinois		
Washington Railway & Electric Co.		1.50	Aurora, Elgin & Fox River Elec. Co.		4.17
Maryland			Chicago & Joliet Electric Ry.....	0.32	0.25
Potomac Edison Co.....		0.13	Chicago North Shore & Milwaukee R.R.....		5.30
Potomac Public Service Co.....		1.67	Chicago Rapid Transit Co.....		20.30
United Railways & Electric Co.....	0.86	17.00	Chicago Surface Lines.....	8.18	11.02
New Jersey			Chicago & West Towns Ry.....		1.25
Coast Cities Ry.....		1.00	East St. Louis & Suburban Ry.....		5.35
Five Mile Beach Electric Ry.....		4.00	Evanston Railway.....		2.00
Morris County Traction Co.....		0.79	Illinois Central Electric Ry.....	0.18	0.80
Trenton & Mercer County Traction Corp.....	0.55	2.04	Ill. Power & Light Corp.....		0.70
New York			Pekin Municipal Ry.....		2.00
Auburn & Syracuse Elec. R.R.....		0.35	Rockford & Interurban Ry.....		1.528
Brooklyn City Railroad.....		6.65	Sterling, Dixon & Eastern Elec. Ry.	0.07	0.234
Brooklyn-Manhattan Transit Corp.	8.311	6.479	Indiana		
Empire State Railroad.....		4.33	Chicago, South Bend & Northern Ind. Ry.....		1.80
Fonda, Johnstown & Gloversville R.R.....		0.78	Indiana Service Corp.....	1.89	6.85
Hamburg Ry.....		1.00	Interstate Public Service Co.....		0.60
Interborough Rapid Transit Co.....	3.41	5.027	Northern Indiana Power Co.....		0.80
International Railway.....		0.20	Southern Indiana Gas & Elec. Co.....	0.753	0.561
Kingston Consolidated Railway.....		0.20	Union Trac. Co. of Ind.....		0.46
Mazara Junction Ry.....	0.142	1.40	Iowa		
New York & Harlem Railroad.....		0.54	Clinton Street Ry.....		0.54
New York & Long Island Traction Co.		1.138	Des Moines City Ry.....	4.20	1.40
New York & Queens County Ry.....		7.47	Dubuque Electric Co.....		1.00
New York State Rys.....	0.48		Keokuk Electric Co.....		0.60
New York, Westchester & Boston Ry.	0.044		Mississippi Valley Electric Co.....		0.30
Poughkeepsie & Wappingers Falls Ry.....		1.00	Sioux City Service Co.....	0.30	1.00
Richmond Lt. & R.R.....	0.05	4.10	Tri-City Ry.....	0.87	5.29
Rochester, Lockport & Buffalo R.R.		0.40			

Track Built and Rebuilt During 1924 (Concluded)

Name of Railway	Extensions, Miles City Interurban	Rebuilt, City	Miles, Interurban	Name of Railway	Extensions, Miles City Interurban	Rebuilt, City	Miles, Interurban
Kentucky				Arizona			
Cincinnati, Newport & Covington Ry.....		1.00		Tucson Rapid Transit Co.....		0.51	
Kentucky Traction & Terminal Co. 0.70				California			
Louisville Ry.....	1.556	4.526	0.45	Key System Transit Co.....	1.65	0.66	8.00
Mayville Street Railroad.....		0.50		Los Angeles Railway.....	3.56		20.13
Paducah Railway Co., Inc.....		0.30		Market Street Railway.....			5.491
Michigan				Munic. Ry. of San Francisco.....	4.73		
City of Detroit—Dept. of Street Rys. 7.817		3.066		Pacific Electric Ry.....	2.15	8.29	3.51
Detroit United Railway.....	4.90	1.82		Pacific Gas & Electric Co.....			5.16
Grand Rapids Railway.....	0.815	0.649		Peninsular Ry.....			0.61
Marquette City Railway.....		0.88		Petaluma & Santa Rosa R.R.....		0.65	1.06
Menominee & Marinette Lt. & Trac. Co.....		0.459		Sacramento & Northern Railroad.....		0.42	
Muskegon Traction & Lighting Co. 0.289		0.207		San Diego & Arizona Ry.....			0.848
Saginaw Transit Co.....		3.70		San Diego Electric Railway.....	3.248	18.891	5.468
Minnesota				San Francisco, Napa & Calistoga Ry.....			0.34
Duluth Street Railway.....	2.03	2.00		Santa Barbara & Suburban Railway.....			0.28
Twin-City Rapid Transit Co.....	3.60	16.23		Colorado			
Missouri				Denver & Intermountain R.R.....		2.217	4.047
Cape Girardeau-Jackson Interurban Ry.....		0.50		Denver Tramway.....	0.698	0.206	8.225
Kansas City, Lawrence & Topeka Elec. R.R.....			0.11	Grand River Valley Ry.....		5.50	1.747
Kansas City Railways.....	2.019	7.197		Southern Colorado Power Co.....			0.917
Missouri & Kansas Ry.....		1.00					0.565
Springfield Traction Co.....		0.31		Kansas			
St. Joseph Ry., Lt., Ht. & Pwr. Co. 0.32		1.23		Kansas Electric Power Co.....			1.00
United Railways Company of St. Louis.....	1.33	0.12	12.34	Salina Street Ry.....			2.00
Ohio				Hutchinson Interurban Ry.....			1.00
Cincinnati & Dayton Traction Co.....			6.00	Montana			
City of Ashtabula.....		0.18		Butte Electric Railway.....	0.06		0.16
Cincinnati Traction Co.....	10.12	4.00		Helena Light & Railway Co.....		0.42	0.50
Cleveland Railway.....	1.23	11.28		Missoula Street Railway.....			0.34
Columbus, Delaware & Marion Elec. Co.....				Montana Power Co.....	1.32		0.48
Columbus, Newark & Zanesville Elec. Ry.....		1.00		Nebraska			
Community Traction Co.....	1.15	1.27		Omaha & Council Bluffs St. Ry.....			10.00
Dayton, Covington & Piqua Traction Co.....			1.00	New Mexico			
Dayton, Springfield & Xenia Southern Ry.....			0.19	City Electric Co.....			3.00
Lake Shore Elec. Ry.....		2.27	0.56	North Dakota			
Lancaster Traction & Power Co.....		1.88		Northern States Power Co.....			0.34
Lima City Street Railway.....				Texas			
Lima Toledo Railroad.....	0.34	4.00	4.00	Ahilene Traction Co.....			0.50
Northern Ohio Traction & Lt. Co.....		0.17	50.08	Bryan-College Traction Co.....		0.25	4.00
Ohio Public Service Co.....		5.00		Dallas Railway.....	4.65		1.53
Ohio River Electric Railway.....		2.24		El Paso Electric Railway.....	0.64		0.61
Pennsylvania-Ohio Electric Co.....	0.677	1.10		Galveston Electric Co.....			1.00
People's Railway.....	0.061	0.449		Houston Electric Co.....	1.88		5.73
Springfield Ry. Co.....			1.00	Northern Texas Traction Co.....	4.647		4.87
Springfield & Xenia Railway.....		0.75		San Antonio Public Service Co.....	3.605		0.189
Stark Electric Railroad.....				Texas Electric Railway.....	0.71		2.46
Wisconsin				Texas Interurban Railway.....		4.11	
Lake Superior District Pwr. Co.....	0.50			Utah			
Madison Railways.....	0.18	0.38		Utah Light & Traction Co.....			1.13
Milwaukee Elec. Ry. & Lt. Co.....	2.679	10.475	0.928	Washington			
Wisconsin Power & Light Co.....		2.46		Grays Harbor Ry. & Lt. Co.....	0.25		0.50
Wisconsin Public Service Corp.....		0.50		Pacific Northwest Trac. Co.....	4.94		
Wisconsin Ry., Lt. & Pwr. Co.....	0.70	0.78		Puget Sound International Ry. & Power Co.....			1.619
Wisconsin Valley Elec. Co.....		0.51		Puget Sound Elec. Ry.....			0.44
Totals	59.526	12.780	174.207	Seattle Munic. St. Ry.....	0.34		13.007
Alabama				Walla Walla Valley Ry.....		7.05	
Alabama Power Co.....	0.30	0.90		Willapa Electric Co.....	0.02		0.19
Birmingham Electric Co.....	1.661	10.979		Yakima Valley Transportation Co.....		0.15	
Mobile Light & Railroad.....		1.192		Totals	39.098	48.814	115.847
Arkansas				Manitoba			
Arkansas Central Power Co.....	2.40	1.19		Winnipeg Elec. Ry.....	2.21	1.32	1.12
Hot Springs St. Railway.....		1.22		New Brunswick			
Florida				New Brunswick Power Co.....	0.34		1.09
Jacksonville Traction Co.....		0.38		Nova Scotia			
Pensacola Elec. Co.....		0.66		Cape Breton Electric Co.....			0.25
Georgia				Ontario			
Georgia Railway & Pwr. Co.....	2.583	0.187	6.818	Brantford Munic. Railway.....	35.00		
Macon Ry. & Light Co.....		0.20		Dominion Power & Transmission Co.....			0.30
Louisiana				Ft. William Electric Ry.....	0.50		2.50
Baton Rouge Electric Co.....	3.26	3.02		Hydro Electric Railways.....	0.52	0.55	1.50
New Orleans Public Service, Inc.....	2.20	14.20		International Transit Co.....	3.39		
Shreveport Railways.....	0.74	0.83		Kitchener & Waterloo St. Ry.....	0.30		2.25
Mississippi				Ottawa Electric Ry.....	1.50		
Laurel Light & Railway Co.....		1.00		Peterboro Radial Ry.....			0.44
North Carolina				Toronto Transportation Commission	10.006		1.994
Durham Public Service Co.....		0.80		Windsor, Essex & Lake Shore Rapid Ry.....		0.75	1.50
Southern Public Utilities Co.....	0.75			Quebec			
Tennessee				Hull Electric Co.....			0.25
Knoxville Power & Light Co.....	0.614	1.002		Levis County Railway.....			0.15
Union Traction Co.....		1.00		Montreal & Southern Counties Ry.....	0.13	1.64	0.26
Totals	14.508	0.847	43.731	Montreal Tramways.....	6.34	1.77	15.11
Alberta				Quebec Railway, Light & Power Co.....	2.93		0.94
Lethbridge Munic. St. Ry.....				Saskatchewan			
Totals			1.00	Regina Munic. Railway.....			0.20
Manitoba				Sherbrooke Ry. & Power Co.....	0.21		0.24
Winnipeg Elec. Ry.....	2.21	1.32	1.12	Alberta			
New Brunswick				Lethbridge Munic. St. Ry.....			0.79
New Brunswick Power Co.....	0.34		1.09	Totals	63.376	6.030	23.384
Nova Scotia							14.610
Cape Breton Electric Co.....			0.25				
Ontario							
Brantford Munic. Railway.....	35.00						
Dominion Power & Transmission Co.....			0.30				
Ft. William Electric Ry.....	0.50		2.50				
Hydro Electric Railways.....	0.52	0.55	1.50				
International Transit Co.....	3.39						
Kitchener & Waterloo St. Ry.....	0.30		2.25				
Ottawa Electric Ry.....	1.50						
Peterboro Radial Ry.....			0.44				
Toronto Transportation Commission	10.006		1.994				
Windsor, Essex & Lake Shore Rapid Ry.....		0.75	1.50				
Quebec							
Hull Electric Co.....			0.25				
Levis County Railway.....			0.15				
Montreal & Southern Counties Ry.....	0.13	1.64	0.26				
Montreal Tramways.....	6.34	1.77	15.11				
Quebec Railway, Light & Power Co.....	2.93		0.94				
Saskatchewan							
Regina Munic. Railway.....			0.20				
Sherbrooke Ry. & Power Co.....	0.21		0.24				
Alberta							
Lethbridge Munic. St. Ry.....			0.79				
Totals			1.00				

the Cincinnati Traction Company and the Toronto Transportation Commission. Each of these was approximately 10 miles in extent.

Among the railways which have done extensive reconstruction of city track during the past year are the Twin City Rapid Transit Company, Minneapolis; United Railways, St. Louis; Birmingham Electric Company, New Orleans Public Service, Inc., Seattle Municipal Railway and the Montreal Tramways. Each of these companies rebuilt more than 10 miles of track during the year. Many other railways did smaller amounts of city track reconstruction. Of the total of 764 miles of track rebuilt in 1924, 585 miles, or more than 75 per cent, was on city lines.

Extensive reconstruction of interurban track was done by the Pacific Electric Railway and the San Fran-

cisco, Napa & Calistoga Railway. Other companies also did considerable amounts of this work during the year. The total trackage involved, however, amounted to only about 178 miles.

Electric railway trackage partially abandoned in 1924 was slightly larger than in 1923, the total last year being 258 miles as compared with 240 the preceding year. City abandonments increased somewhat, while the mileage of interurban abandonments decreased.

Only one abandonment was of sufficient extent to be of general interest—that of the Middlesex & Boston Street Railway. This company suspended railway service on 27 miles of track and inaugurated bus service to care for the transportation needs of several suburban towns, as told in the ELECTRIC RAILWAY JOURNAL in the issue of Dec. 6.

Abandonments—Partial—1924

Includes All Pieces of Track Sidings, Yard, Etc., Permanently Abandoned—Companies Arranged Alphabetically by States

	City	Inter-urban		City	Inter-urban
Connecticut			Missouri		
Connecticut Company.....	3.651	0.384	United Railways Co. of St. Louis.....	0.01	.....
Hartford & Springfield St. Ry.....	.....	2.30			
Maine			Ohio		
York Utilities Co.....	.....	16.02	Cincinnati Traction Co.....	1.45	.....
Massachusetts			Cleveland Railway.....	0.584	.....
Berkshire St. Railway.....	.....	9.201	Community Traction Co.....	5.62	.....
Boston Elevated Railway.....	8.01	.....	Lima City Street Railway.....	0.30	.....
Eastern Mass. St. Ry.....	4.08	3.63	Pennsylvania-Ohio Electric Co.....	1.58	.....
Massachusetts Northeastern St. Ry.....	.....	6.22			
Middlesex & Boston St. Ry.....	27.46	.....	Wisconsin		
New Hampshire			Milwaukee Elec. Ry. & Lt. Co.....	0.839	.....
Portsmouth Electric Railway.....	1.31	.....	Wisconsin Power & Light Co.....	.....	8.25
Rhode Island			Wisconsin Ry., Lt. & Power Co.....	0.67	.....
United Electric Railways.....	2.00	.....		
Maryland			Kentucky		
United Railways and Electric Co.....	0.50	.....	Louisville Ry.....	1.959	.....
New Jersey					
Five Mile Beach Electric Railway.....	0.09	.....	Alabama		
New York			Alabama Power Company.....	0.52	.....
Geneva, Seneca Falls & Auburn R.R.....	0.20	.....	Birmingham Elec. Co.....	7.706	.....
Interborough Rapid Transit Co.....	1.63	.....	Mobile Light & Railroad.....	3.69	.....
New York & Harlem Railroad.....	0.04	.....		
New York & Long Island Traction Co.....	2.097	.....	Arkansas		
Rochester, Lockport & Buffalo R.R.....	.....	0.93	Arkansas Central Power Co.....	0.19	.....
Third Ave. Ry. System.....	7.299	.....		
United Traction Co.....	.....	0.03	Florida		
New York, New Haven & Hartford R.R.....	0.015	.....	Pensacola Electric Co.....	.....	0.60
New York State Railways.....	0.74	.....		
Niagara Junction Ry.....	0.015	.....	Georgia		
Peekskill Lighting and Railroad Co.....	3.38	.....	Georgia Railway & Power Co.....	1.718	.....
Pennsylvania					
Altoona & Logan Valley Electric Ry.....	.....	0.24	Louisiana		
Jefferson Traction Co.....	.....	6.00	New Orleans Public Service, Inc.....	4.11	.....
Northumberland County Ry.....	2.00	.....		
Pennsylvania & Maryland St. Ry.....	.....	4.00	Tennessee		
Philadelphia Rapid Transit Co.....	1.735	.....	Knoxville Power & Light Co.....	0.276	.....
Pittsburg County Ry.....	0.45	.....		
Seranton Railway.....	3.00	8.20	California		
United Traction St. Railway.....	.....	0.50	Key System Traction Co.....	1.60	.....
Valley Railways.....	3.00	.....	Market Street Railway.....	0.010	.....
West Penn. Railways.....	0.50	.....	Pacific Electric Railway.....	3.43	1.20
York Railways.....	0.40	.....	San Diego Electric Railway.....	4.736	2.437
			San Francisco-Sacramento Railroad.....	.....	10.50
Virginia					
Newport News & Hampton Ry. Gas & Elec. Co.....	.....	1.90	Colorado		
Virginia Ry. & Power Co.....	0.88	.....	Denver Tramway.....	1.592	.001
			Southern Colorado Power Co.....	0.955	.....
West Virginia					
Monongahela West Penn. Public Service Co.....	.....	0.03	Idaho		
Princeton Power Co.....	0.22	.....	Boise Valley Traction Co.....	2.26	.....
Illinois					
Chicago Surface Lines.....	0.27	.....	Kansas		
Chicago & Joliet Electric Ry.....	.....	1.89	Hutchinson Interurban Ry.....	.50	.....
East St. Louis & Suburban Ry.....	3.00	0.02			
Ill. Power & Light Corp.....	1.06	.....	Montana		
Sterling Dixon & Eastern Elec. Ry.....	.....	0.02	Helena Light & Railway.....	0.12	1.21
Indiana					
Indiana, Columbus & Eastern Trac. Co.....	.....	6.42	Texas		
			Dallas Ry.....	0.932	.....
Iowa			El Paso Electric Railway.....	0.24	.....
Keokuk Electric Co.....	0.90	.....	Northern Texas Trac. Co.....	0.348	.....
Tri-City Railway Company.....	5.23	.....	San Antonio Public Service Co.....	4.387	.....
Waterloo, Cedar Falls & Nor. Ry.....	0.20	.....		
Michigan			Washington		
City of Detroit—Department St. Rys.....	9.0048	.....	Pacific Traction Co.....	2.57	.....
Grand Rapids Railway.....	0.637	.....	Puget Sound International Ry. & Power Co.....	0.327	.....
Menominee & Marinette Lt. & Traction Co.....	0.214	.....	Seattle Munic. Ry.....	0.94	.....
Muskegon Traction & Lighting Company.....	0.453	.....	Tacoma Ry. & Power Co.....	1.29	.....
Saginaw Transit Co.....	0.77	5.40			
			Canada		
			Fort William Electric Ry.....	0.50	.....
			Hydro Electric Power Commission.....	0.16	.....
			Lethbridge Munic. St. Railway.....	0.71	.....
			Montreal Tramways.....	1.06	.....
			St. Johns Electric Company.....	2.1	.....
			Toronto Transportation Commission.....	2.490	.....
			Winnipeg Electric Co.....	.....	0.416
			Totals.....	160.919	97.949

Car Orders Exceed High Level of 1923

Number of Passenger Cars Ordered for Interurban Service Highest Since 1913 — Fewer Passenger Cars Ordered for City Service—One-Man, Two-Man Cars Constitute More than 60 per Cent of Total Cars Ordered for City Service

THE high level of purchases of electric railway rolling stock which began in 1920 was again exceeded during last year. This is shown by the statistics for new cars ordered during 1924 as given in the accompanying tables. While there was a marked recession in orders during 1921, which marked the low level, a large increase in buying began in 1922, and this was exceeded during 1923 and 1924. The total of 4,092 cars and locomotives ordered during 1924 is not only slightly greater than last year but it exceeds any previous year since 1913. The maintaining of this high level shows that stability has again been established in the industry and that confidence has been restored. This augurs well for the future.

The analysis in Table V of various types of cars ordered shows in a very striking manner that the one-man,

A comparison of the various figures for passenger cars ordered during 1924 with similar ones for 1923 further demonstrates the swing toward cars for one-man, two-man operation. The totals for all other types of cars purchased show a decrease, while the one-man, two-man type has increased from 1,114 to 1,262. The total of all types of one-man cars for 1924 is 260, as

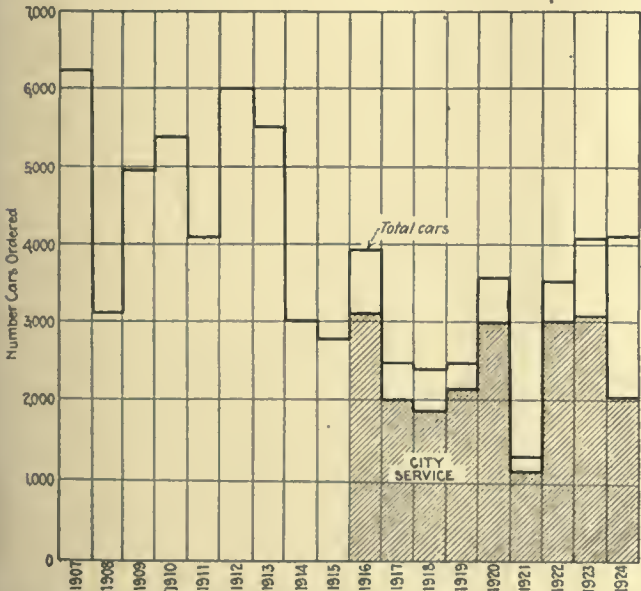
TABLE I—NEW ROLLING STOCK ORDERED SINCE 1907

Year	Passenger Cars		Freight and Miscellaneous Cars	Electric Locomotives	Total
	City	Interurban			
1907	3,483	1,327	1,406	(a)	6,216
1908	2,208	727	176	(a)	3,111
1909	2,537	1,245	1,175	(a)	4,957
1910	3,571	990	820	(a)	5,381
1911	2,884	626	505	(a)	4,015
1912	4,531	783	687	(a)	6,001
1913	3,820	547	1,147	(a)	5,514
1914	2,147	384	479	(a)	3,010
1915	2,072	336	374	(a)	2,782
1916	3,046	374	491	31	3,942
1917	1,998	185	223	49	2,455
1918	1,842	255	278	44	2,419
1919	2,129	128	172	18	2,447
1920	2,889	227	465	17	3,598
1921	1,059	129	81	7	1,276
1922	2,912	187	405	34	3,538
1923	2,915	427	595	92	4,029
1924	1,985	538	1,538	31	4,092

(a) Included in "Freight and Miscellaneous Cars."

compared with 551 for 1923. The number ordered during the past year is thus seen to be less than half of that of the previous year.

A comparison of figures for the length, seating capacity and weight of cars ordered during 1924 shows that they have remained about the same as for 1923. The preponderance of orders is for light-weight, double-



New Cars and Locomotives Ordered by Years. The Division Into City and Interurban Cars Is Not Made Prior to 1916

two-man cars are most popular. A total of 1,262 cars of the one-man, two-man type were purchased during the past year. Of these, 1,224 were for city service and 38 for interurban service. The orders for this type of car for city service are thus seen to constitute more than 60 per cent of the total for this class of service. Purchases of one-man single-truck cars with 28-ft. body were but 103—the lowest since this type of car came into popularity in 1916. The number of one-man cars purchased with bodies larger than 28 ft. included 28 single-truck cars and 68 double-truck cars for city service and 9 single-truck and 52 double-truck for interurban service. The number of cars ordered for straight two-man operation shows a decided decrease, there being but 279 of these for city service and 100 for interurban service. It is evident that development of the one-man, two-man type of car is rapidly causing it to replace the straight two-man car.

TABLE II—SPECIAL COMPARISON OF NEW ROLLING STOCK ORDERS BY YEARS

	1924	1923	1922	1921	1920	1919	1918	1917	1916
Number of rail-ways reporting new cars.....	119	167	145	94	172	160	140	182	250
City Service									
Number of one-man cars (28-ft. body S. T.)....	103	312	772	565	1,699	1,383	644	280	187
Number of one-man cars other than 28-ft. body	96	183	227	....	....	....	....	....	....
Number of one-man, two-man cars.....	1,224	1,076	471	....	....	....	....	....	....
Number of two-man passenger motor cars*....	537	1,097	1,290	383	847	635	1,068	1,316	2,731
Number of passen-ger trailers.....	25	247	150	111	343	111	130	402	128
Service cars.....	44	121	103	47	104	31	(a)	(a)	(a)
Total cars city service.....	2,029	3,036	3,015	1,106	2,993	2,160	1,842	1,998	3,046
Interurban Service									
Number of one-man cars.....	61	56	40	....	....	....	....	....	....
Number of one-man, two-man cars.....	38	38	9	....	....	....	....	....	....
Number of two-man motor cars*....	435	330	122	103	195	96	200	158	303
Number of passen-ger trailers.....	4	3	16	26	32	32	55	27	71
Number of freight, express and mis-cellaneous cars..	1,494	474	302	34	361	141	(a)	(a)	(a)
Total cars Inter-urban service.....	2,032	901	489	163	588	269	255	185	374
Total number of cars.....	4,061	3,937	3,538	1,269	3,581	2,429	2,375	2,406	3,911
Number of electric locomotives....	31	92	34	7	17	18	44	49	31

*Includes motor and trail cars for subway, elevated and train service
(a) Not available.

truck cars. Nearly all of the cars with double trucks are equipped with four motors. This is in line with the practice established in recent years of using quadruple motor equipments with small diameter wheels.

There were 16 electric railways that ordered 50 or more cars during 1924, the same number as for 1923. Of these, the Brooklyn City Railroad ordered 335 one-man, two-man cars, the Pittsburgh Railways 125 one-man, two-man and 100 two-man cars, the Illinois Central Railroad ordered 130 motor cars and 85 trailers

for train operation, the Interborough Rapid Transit Company 150 motor cars for train operation and the Los Angeles Railway 121 one-man, two-man cars. Orders for 100 cars each were placed by the Philadelphia Rapid Transit Company and the Chicago Surface Lines for one-man, two-man types. The Chicago Rapid Transit Company also ordered 100 cars for train operation. In addition to these railways, the Baltimore & Ohio Railroad ordered 80 passenger cars for train operation on the Staten Island Rapid Transit lines,

Table III—Details of Rolling Stock Ordered During 1924

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Over All Ft. In.	Seating Capacity	Total Wt. Light Tons	No. Motors	No. Cars Junked During Year
New England States											
Connecticut											
New York, New Haven & Hartford R.R.	3	Passenger	Interurban	Motor	Double	Two	71—11	106	87.75	4	
	10	Passenger	Interurban	Motor	Double	Two	72— 7½	80	60.00	2	
Maine											
Fairfield & Shawmut Ry.	2	Passenger	Interurban	Motor	Single	Two		60		2	
Somerset Traction Co.	1	Passenger	Interurban	Motor	Single	One	30—0	32		2	
Massachusetts											
Boston Elevated Ry.	56	Passenger	City	Motor	Double	Both	45— 0	44	15.70	4	
	8	Passenger	City	Motor	Double	Train	47— 3	48	22.00	4	
Eastern Massachusetts St. Ry.											84 CM
East Taunton St. Ry.	4	Passenger	Interurban	Motor	Double	One	40— 0	36	23.00	4	
Massachusetts Northeastern St. Ry.	5	Passenger	City	Motor	Double	Both	41— 4½	44	17.12	4	
Worcester Consolidated Street Ry.											1 CM
New Hampshire											
Chester & Derry R.R.	1	Sweeper	Interurban	Motor							
Nashua St. Ry.	2	Passenger	City	Motor	Single	One	28— 0	33	8.00	2	
Rhode Island											
United Electric Railways											235 STM
Vermont											
Springfield Terminal Ry. Co.											1 CM
Total cars New England States	92										
Eastern States											
District of Columbia											
Washington Railway & Electric Co.	6	Passenger	City	Motor	Double	Two	42— 3	44	20.90	4	
	4	Passenger	City	Motor	Double	Two	42— 3	44	19.27	2	
Maryland											
Baltimore & Ohio R.R.	80	Passenger	Interurban	Motor	Double	Train	67— 0	71	47.50	2	
New Jersey											
Coast Cities Ry. Co.	7	Passenger	City	Motor	Double	Both	40— 0	40	16.00	4	
	6	Passenger	City	Motor	Single	One	28— 0½	32	8.20	2	
Five Mile Beach Electric Ry.											1 CM
Morris County Traction Co.	10	Passenger	Interurban	Motor	Double	One	41—10	48	16.00	4	
Trenton & Mercer County Traction Co.	20	Passenger	City	Motor	Double	Both	45— 0	48	17.24	4	
New York											
Brooklyn-Manhattan Transit Corp.	4*	Passenger	City	Both	Four	Two	137— 0	160		4	302 CM 3 CT
Buffalo & Erie Railway	14	Passenger	Interurban	Motor	Double	One	44— 2	41	18.50	4	
	4	Passenger	City	Motor	Single	One	26— 2	31	8.50	2	
Fonda, Johnstown & Gloversville R.R.	1	Passenger	Interurban	Motor	Double	Two	52— 9	57		4	5 CM
Interborough Rapid Transit Co.	125	Passenger	City	Motor	Double	Train	51— 0½	46	39.50	2	7 CM
	25	Passenger	City	Motor	Double	Train	51— 0½	46	37.80	2	3 CT
Long Island R.R.	40	Passenger	Interurban	Motor	Double	Train	63— 4½	78	57.50	2	
New York & Queens County Ry.											5 CM
New York State Rys., Rochester	1	Dump	City	Motor	Double		40— 6		22.50	4	
	1	Dump	City	Trailer	Double		40— 6		16.00		
New York, Westchester & Boston Ry.	10	Passenger	Interurban	Motor	Double	Two	72— 0	80	60.00	2	
Olean, Bradford & Salamanca Ry. Co.	4	Passenger	City	Motor	Single	One	29— 1	28	9.76	2	1 IM
Poughkeepsie & Wappingers Falls Ry.	2	Passenger	City	Motor	Single	Both	41—10	44	16.50	4	5 CM
Richmond Light & R.R. Co.	25	Passenger	City	Motor	Double	Both	44— 0	44	16.90	4	
	2	Sweeper	City	Motor	Double		39— 0		27.35		
Schenectady Railway	10	Passenger	City	Motor	Double	One	41— 4½	48	16.00	4	
The Brooklyn City R.R.	335	Passenger	City	Motor	Double	Both	44— 2	50	20.75	4	25 CM Service 69 CM 25 CMS
Third Avenue Railway	49	Passenger	City	Motor	Single	Both	30— 5	36	8.55	2	88 CM
	1	Passenger	City	Motor	Single	Both	35— 3	44	8.55	2	
Pennsylvania											
Bangor & Portland Transit Co.	1	Passenger	Interurban	Motor	Single	One	28— 0½	32	8.60	2	
East Penn. Electric Co.	8	Passenger	Interurban	Motor	Double	Both	43—10	48	17.78	4	
	8	Passenger	Interurban	Motor	Double	Both	38—11	40	17.11	4	
Hershey Transit Co.	1	Express	Interurban	Motor	Double	Two	40— 6		30.00	4	
Johnstown Traction Co.	3	Passenger	City	Motor	Double	Both	47— 0	50	19.54	4	
Lackawanna & Wyoming Valley R.R. Co.	4	Passenger	Interurban	Motor	Double	Two	60— 6	72	41.25	2	
Philadelphia & West Chester Traction Co.	10	Passenger	Interurban	Motor	Double	Two	47—10	64	29.54	4	
Philadelphia & Western Railway Co.	1	Passenger	Interurban	Motor	Double	Two	50— 6	55	30.24	4	
Philadelphia Rapid Transit Co.	100	Passenger	City	Motor	Double	Both	45— 6	53	17.91	2	17 CM 23 CW 203 CM
Pittsburgh Railways	225	Passenger	City	Motor	Double	Both	45— 0	54	19.00	4	7 CM 2 SM 8 IM
Reading Transit & Light Co.											
Shamokin & Mt. Carmel Transit Co.	4	Passenger	Interurban	Motor	Double	Both	45— 0	48	18.00	4	
	1	Passenger	City	Motor	Single	One	28— 0½	33	8.10	2	
Westchester Street Railway	1	Passenger	City	Motor	Single	One	28— 0½	33	8.33	2	
	6	Passenger	Interurban	Motor	Double	Two	57— 0	70	25.00	4	
West Penn. Rys.	6	Freight	Interurban	Motor	Double		46— 7		22.00	4	
	1	Sweeper	Interurban	Motor	Single		35— 0			2	
York Railways	2	Passenger	City	Motor	Double	Both	42— 0	44	16.50	4	
	3	Passenger	Interurban	Motor	Double	Both	47— 6	52	19.70	4	

* Three-section units.

Table III—Details of Rolling Stock Ordered During 1924—(Continued)

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Over All Ft. In.	Seating Capacity	Total Wt. Light Tons	No. Motors	No. Cars Junked During Year
West Virginia											
Monongahela & West Penn Public Service Co.	3	Passenger	City	Motor	Single	One	28—0½	28	9.00	2	
Princeton Power Co.	4	Passenger	City	Motor	Double	Two	37—2	40	14	4	
	2	Passenger	Interurban	Motor	Double	Two	37—2	40	14	4	
Sistersville & New Martinsville Traction Co.	3	Passenger	Interurban	Motor	Double	Both	42—9	46	15.34	4	
Tygarta Valley Traction Co.	3	Passenger	City	Motor	Single	One	28—0½	33	8.00	2	2 CT
Wheeling Traction Co.	21	Passenger	City	Motor	Double	One	42—6	44	10.50	4	8 CM
Total cars Eastern States	1206										
Central States											
Illinois											
Chicago North Shore & Milwaukee R.R.	1	Freight	Interurban	Trailer	Double		40—6		21.50		2 CM
Chicago Rapid Transit Co.	100	Passenger	City	Motor	Double	Train	48—0	52	37.50	2	7 CM
Chicago Surface Lines	100	Passenger	City	Motor	Double	Both	48—11	51	20.50	2	
East St. Louis & Suburban Ry.	1	Dump	City	Motor	Double		40—6		22.50	4	
Illinois Central R.R.	85	Passenger	Interurban	Trailer	Double	Train	72—7½	84	42.00		
	130	Passenger	Interurban	Motor	Double	Train	72—7½	84	62.50	4	
Illinois Pwr. & Lt. Corp.	5	Passenger	City	Motor	Single	One	28—0½	32	8.00	2	
Kankakee & Urbana Traction Co.	1	Passenger	Interurban	Motor	Double	One	42—0	52	18.00	4	
Indiana											
Gary & Valparaiso Ry.	2	Passenger	Interurban	Motor	Double	Two	44—8½	44	21.29	4	
Indiana Service Corp.											7 CM 1 IM
	1	Passenger	Interurban	Trailer	Double		52—0	50	27.00		
	2	Parl. Dnr.	Interurban	Motor	Double	Both	62—0	26	45.50	2	
Interstate Public Service Co.	3	Sleeping	Interurban	Trailer	Double		62—0	20	39.40		
	2	Express	Interurban	Motor	Double		60—0		44.35	4	
	10	Freight	Interurban	Trailer	Double		52—0		27.25		
	2	Stock	Interurban	Trailer	Double		42—0		26.50		
	10	Freight	Interurban	Trailer	Double		39—7		26.50		
Terre Haute, Indianapolis & Eastern Tr. Co.	2	Misc.	Interurban	Trailer	Double		40—0		28.50		
	6	Freight	Interurban	Trailer	Double		38—3		15.50		
	15	Passenger	Interurban	Motor	Double	Two	61—0	66	45.00	4	
	6	Passenger	City	Motor	Single	One	28—0	34	9.00	2	
Union Traction Co. of Ind.	5	Express	Interurban	Motor	Double		53—0		36.00	4	
	15	Freight	Interurban	Trailer	Double		43—0		18.50		
	5	Stock	Interurban	Trailer	Double		38—0		16.00		
Winona Service Co.	3	Passenger	Interurban	Motor	Double	Two	49—9	42	25.00	4	
	4	Passenger	City	Motor	Single	One	27—10	32	8.75	2	
Iowa											
Tri-City Railway	1	Dump	City	Motor	Double		40—6		22.50	4	
Waterloo, Cedar Falls & Northern Ry.											37 IM
Kentucky											
Kentucky Traction & Terminal Co.	2	Passenger	City	Motor	Single	One	26—4	24	6.50	2	17 CM 4 IM
Michigan											
	75	Passenger	City	Motor	Double	Two	48—5	52	18.50	4	173 CM
City of Detroit—Dept. of St. Rys.	1*	Passenger	City	Motor	Four	Two	122—8	140	37.50	6	
	2	Dump	City	Motor	Double		40—6		22.50	4	
	4	Dump	City	Trailer	Double		40—6		16.00		
	30	Passenger	City	Motor	Double	Both	41—11	52	14.25	4	133 CM
	20	Passenger	City	Motor	Double	Both	42—6	51	14.25	4	
Detroit United Rys.	10	Passenger	Interurban	Motor	Double	Both	43—2	46	18.75	4	
	10	Passenger	Interurban	Motor	Double	Two	56—6	54	33.15	4	
	50	Freight	Interurban	Trailer	Double				20.75		
Graod Rapids Railway	3	Passenger	City	Motor	Double	Both	37—6	44	12.00	4	
Menominee & Marinette Lt. & Tr. Co.	6	Passenger	City	Motor	Single	One	28—0½	30	8.25	2	4 CM
Michigan Electric Ry.	15	Freight	Interurban	Trailer	Double		50—0		19.62		
	2	Freight	Interurban	Motor	Double		50—0		29.50	4	
Saginaw Transit Co.											6 CM
Minnesota											
Duluth St. Railway	5	Passenger	City	Motor	Double	One	36—0	43	11.00	4	
Missouri											
United Railways of St. Louis	1	Dump	City	Motor	Double		40—6		22.50	4	26 CM
	1	Dump	City	Trailer	Double		40—6		16.50		
Ohio											
Cincinnati, Georgetown & Portsmouth R.R.	2	Passenger	Interurban	Motor	Double	One	40—0	47	13.00	4	
City of Ashtabula, Div. of Street Rys.	1	Sweeper	City	Motor	Single		30—0				
	25	Passenger	City	Motor	Double	Two	52—5½	56	22.10	4	73 CM
	4	Dump	City	Motor	Double		40—6		22.50	4	
Cleveland Railways	2	Dump	City	Trailer	Double		40—6		16.00		
	2	Crane	City	Motor	Double		46—0				
	2	Rail	City	Trailer	Double		60—0				
Columbus, Newark & Zanesville Elec. Ry. Co.	20	Passenger	City	Motor	Single	One	29—8	28	9.50	2	8 CM
Ohio Public Service Co.	1	Passenger	Interurban	Motor	Double	One	39—4½	44	15.00	4	
Portsmouth Public Service Co.	3	Passenger	City	Motor	Double	Both	42—11	50	13.00	4	
Stark Electric R.R.	1	Dump	Interurban	Trailer							
The Cincinnati & Dayton Traction Co.	6	Passenger	City	Motor	Single	One	48—0½	32	8.50	2	
The Cincinnati Traction Co.	1	Dump	City	Motor	Double		40—6		22.50	4	
The Ohio River Elec. Ry. & Pwr. Co.	7	Passenger	Interurban	Motor	Single	One	29—0	24	8.50	2	5 IM
The Pennsylvania-Ohio Electric Co.	4	Passenger	Interurban	Motor	Double	One	43—10½	48	18.50	4	
The Toledo & Indiana R.R.	7	Passenger	Interurban	Motor	Double	One	43—2	50	15.75	4	
Wisconsin											
The Milwaukee Electric Ry. & Lt. Co.											1 CM 27 work
Wisconsin Valley Electric Co.	4	Passenger	City	Motor	Double	One	43—6	52	17.50	4	
Total cars Central States	849										
Southern States											
Alabama											
Birmingham Ry. Lt. & Pwr. Co.	20	Passenger	City	Motor	Double	Two	49—5	62	17.50	4	
	1	Dump	City	Motor	Double		40—6		22.50	4	
	2	Dump	City	Trailer	Double		40—6		16.00		
Arkansas											
Arkansas Central Pwr. Co.	8	Passenger	City	Motor	Double	Both	42—5½	44	17.50	4	

*Three-section units

the Department of Street Railways for the city of Detroit 75 two-man cars, one articulated unit and six dump cars, the Detroit United Railway 20 cars for interurban service, 50 one-man, two-man cars for city service and 50 freight interurban trail cars, the Boston Elevated Railway ordered 56 one-man, two-man cars and eight additional cars for train operation, New Orleans Public Service, Inc., 55 one-man, two-man cars and 4 dump cars, the Montreal Tramways 25 two-man cars, 25 trailers, two observation cars and one crane car, the Third Avenue Railway, New York, 50 one-man, two-man cars, and the Pacific Electric Railway 50 two-man cars and 1,350 freight cars. Of the above orders, those placed by the Boston Elevated Railway, the Baltimore & Ohio Railroad, the Interborough Rapid Transit Company, the Chicago Rapid Transit Company and the Illinois Central Railroad were for cars for train operation. Adding the cars ordered by the Long Island Railroad, the New York, New Haven & Hartford Railroad, and the Brooklyn-Manhattan Transit Corporation gives a total of 610 cars for train operation.

The numbers of cars junked during 1924, which was 1,853, exceeds that for any other year of which this paper has a record. It compares with 1,689 junked during 1923. It is thus evident that much obsolete rolling stock is being retired to give space for more modern equipment.

According to the replies received the number of companies ordering new rolling stock during 1924 was 119, as compared with 167 for 1923, 145 for 1922 and 94 for 1921. There were thus fewer companies ordering cars, but the average ordered by each company was greater.

In order to show at a glance the relative amount of rolling stock purchased by the various railways year by year, Table I has been prepared. This gives the total number of cars ordered each year since 1907. This divides the cars into four classes: Passenger cars, both city or interurban; freight, express and miscellaneous cars, and electric locomotives. The miscellaneous cars include service cars, snowplows, sweepers, work cars, etc. The chart shows graphically the number of cars ordered each year since 1916. In this chart the cars purchased are divided into two groups, interurban and city service. This division, which has been made in annual surveys of this paper since 1916, was made for passenger cars only prior to that year. It is evident that the number of cars purchased for interurban service this year is the greatest of any recorded, while the number of cars purchased for city service is about the same as for the years 1917, 1918 and 1919.

TABLE IV—ELECTRIC LOCOMOTIVES ORDERED DURING 1924

Name of Railway	Number	Weight, Tons	Length, Over All, Ft. In.
New England States			
Aroostook Valley R.R.	1	60	35-9
New York, New Haven & Hartford R.R.	5	127	52-8
	2	87	39-0
Springfield Terminal Ry.	2	60	38-3
	1	50	35-9
Eastern States			
New York Central R.R.	7	100	37-0
Pennsylvania R.R.	2	170	67-4
	1	120	—
Central States			
Ohio Public Service Co.	1	45	40-0
	1	65	45-0
South West Missouri R.R.	1	50	37-4
Western States			
Pacific Electric Ry.	5	63	32-0
Canada			
Niagara, St. Catharines & Toronto Ry.	2	55	35-4
Total	31		

TABLE V—RECAPITULATION BY DISTRICTS OF CARS ORDERED DURING 1924

	New England States	East-ern States	cen-tral States	South-ern States	West-ern States and Philip-pines	Total for United States	Total for Can-ada	Grand Total
Number of companies reporting new cars.....	8	36	36	14	18	112	7	119
City Service								
One-man cars, 28-ft. body	2	17	29	38	17	103	....	103
One-man cars other than 28 ft.								
Single truck.....		4	20	....	1	25	3	28
Double truck.....		31	9	25	2	67	1	68
One-man two-man cars..	61	769	156	66	138	1,190	34	1,224
Two-man cars (surface)..		18	101	20	113	252	27	279
Motor cars for rapid transit lines.....	8	150	100	....	....	258	....	258
Trailers.....		....	....	....	....	....	25	25
Service and miscellaneous cars.....		4	24	9	3	40	4	44
Total cars city service.	71	993	439	158	274	1,935	94	2,029
Interurban Service								
One man cars, double truck	4	24	15	....	9	52	....	52
Single truck.....	1	1	7	....	....	9	....	9
One-man, two-man cars..		26	12	....	....	38	....	38
Two-man cars.....	15	34	30	....	18	97	3	100
Trailers.....		....	4	....	....	4	....	4
Motor cars for train service.....		120	215	....	....	335	....	335
Express and freight cars..		7	124	....	1,351	1,482	....	1,482
Miscellaneous cars.....	1	1	3	....	6	11	1	12
Total cars interurban service.....	21	213	410	....	1,384	2,028	4	2,032
Electric locomotives.....	11	10	3	....	5	29	2	31
Total cars and electric locomotives.....	103	1,216	852	158	1,663	3,992	100	4,092

The special comparison of cars ordered during the past 9 years, given in Table II, tabulates separately the cars for city service and those for interurban service. Referring to this table, it is interesting to note how the number of 28-ft. safety cars purchased increases each year from 1916 up to and including 1920, and during the same period how the number of large two-man cars shows a gradual decrease. Since that time the number of small safety cars purchased has decreased and the number of larger cars has increased considerably. The highest proportion for the small safety cars was reached in 1919, and since that time there has been a gradual return to the use of larger cars.

Details of rolling stock ordered by individual companies are given in Table III. The arrangement of this table this year is different from that used in preceding years in that in general the arrangement into groups follows one of the plans of grouping the states used by the United States Census Bureau. The railways in each state are arranged in a manner similar to that followed in previous years. Canadian companies are listed separately. In addition to listing the number of cars ordered by the various companies, this table shows the class of car and type of service and also gives length, seating capacity, weight and number of motors. The largest number of cars purchased by railways in any particular state was in New York, which includes 584 passenger cars for city service and 65 passenger cars for interurban service. Pennsylvania comes next with 332 passenger cars for city service and 45 cars for interurban operation.

The articulated type of car makes its first appearance in the list of cars ordered during 1924. The city of Detroit ordered one unit for surface operation and the Brooklyn-Manhattan Transit Corporation four units for rapid transit service. In addition to these, Brooklyn and Baltimore reconstructed cars to form articulated units.

Purchases of electric locomotives during 1924 are listed in Table IV. The total number of new electric locomotives is 31. The New York, New Haven & Hart-

ford and the New York Central were the largest purchasers, each having ordered nine.

The information which has been assembled and given in the accompanying tables of rolling stock was obtained from replies received to questionnaires sent to all electric railways in the United States and Canada. Replies were received from approximately 800 railways this year. With a fixed publication date it is quite impossible to receive the replies from all railways, but this year the answers have been particularly compre-

hensive and the information thus obtained has also been supplemented by items previously published in the *ELECTRIC RAILWAY JOURNAL* and also by very complete lists of car orders furnished by the principal car builders. Through the courtesy and co-operation of the various manufacturers, we have been able to check the figures obtained from the various railways very carefully, and in some cases where replies were not received from the railways themselves, the information furnished by the car manufacturers has been used.

More Financing on Better Terms

Many New Issues Placed With Investing Public Last Year—Sales Not Difficult to Make—
Equipment Trusts on Increase—Buses Included Under Equipment Indentures—
Issues Show Year's Accomplishments

PREDICTIONS made a year ago by bankers with respect to the prospects ahead for the satisfactory sale of securities by the electric railways during 1924 have been borne out by the developments of the year. Whereas for 1923 the total of new bond and note financing in amounts of \$500,000 or more was only \$20,867,000, the total this year is more than \$85,000,000. In the same period of time 10 electric railways sold direct to the riding public more than \$9,750,000 of securities. Of this amount \$7,000,000 were for increases to capital investment to be used for additions, extensions and improvements. The remainder, amounting to \$2,750,000, represents stock purchased in the open market by the electric railways and resold to employees and customers. With possibly a single exception, this past year is the first time that an attempt has been made to sell securities of the electric railways direct to the public. All these are securities of companies that do solely an electric railway business.

FINANCING DONE ON BETTER TERMS

Not only is the amount of bonds sold greater than last year, as has just been pointed out, but it has been possible for the electric railways to do their financing on much better terms. Money has been cheaper, but the entire answer is not to be found there. Rather is it to be found in the growing realization of the essentiality of the industry and its right generally to a living wage.

The biggest piece of electric railway financing in 1924 was that of the Market Street Railway, San Francisco. This was a refunding operation, carried out in January, 1924, to the amount of \$13,000,000. The return of 7 per cent on this issue was the highest with possibly one exception of all the electric railway offerings of the year. From this liberal yield, the income to the investor tapered down to a return of 5.35 per cent on the 10-year Boston Elevated Railway 5½ per cent issue of \$1,581,000 placed at 101.25 and interest. These yields, of course, apply in the case of the general financing and not to the financing covered by equipment trust obligations.

Best of all, the electric railway issues placed in 1924 found a ready market and many of them were snapped up by discriminating investors. One of the companies that participated in the large loans of the Market Street Railway said frankly in a discussion of traction securities intended to reach investors:

"We are taking advantage of the present unfriendliness of the market for street railway securities to obtain for our customers a bond which we are willing to recommend with absolutely no reservations as a conservative investment, giving a return from one-half to one full per cent above what can be obtained on securities of similar values. We do not deny that street

SIX-YEAR RECORD OF NEW ELECTRIC RAILWAY FINANCING INVOLVING BOND OR NOTE ISSUES OF MORE THAN \$500,000

	City Railway	Interurban	City and Suburban
1919.....	\$22,800,000	\$6,050,000	\$7,550,000
1920.....	2,250,000	2,340,000	4,200,000
1921.....	11,740,000	1,900,000	7,250,000
1922.....	865,000	750,000	27,138,000
1923.....	14,562,000		6,305,000
1924.....	50,797,000	21,731,600	11,414,000

railway bonds are still in disfavor; in fact, we would rather stress this disfavor than otherwise, because it is that very condition which enables us to do pioneering work in a neglected field and to obtain an attractive rate for our clients."

This is a very frank statement. It is very much to the point. As a matter of fact, the Market Street Railway offering was by far the largest of its kind made for a long time. There was a certain amount of sales resistance to be overcome in placing the issue. It was overcome and overcome most successfully. Within a comparatively short time the issue had all been placed.

GENERAL OUTLOOK GOOD

On one thing the bankers are agreed. This is that the adverse conditions of the railways in New York City do not weigh with them so much now as they did formerly. They are less prone to measure tractions elsewhere by the New York yardstick. It was generally agreed that the good public relations work has helped materially in strengthening the faith of the bankers in the electric railway situation. The occurrences of suspension of service by railways, notably the withdrawal of service in Akron and the subsequent passing of the new franchise grant there, have gone a long way to prove the essentiality of electric railway service. In this connection, it is interesting to note that the size of the property which seeks to place a security does not weigh heavily with the bankers. They look at situations individually and consider each case on its merits. Thus, at this time, one of the very largest houses has in prospect some electric railway financing to the amount of

only \$700,000. The bankers took this issue because the railway has made a notable record in the past, and the issuing house feels confident that this property, interurban in character, can make as good a record of earnings in the future as it has in the past.

In this connection, one banker said that there has been much talk of the inroads of private automobiles on the suburban and interurban railways, but that while the effect of the increasing use of the private auto had undoubtedly been felt, still people pushing out into the country to live were certain to locate along the line of the railway and that not all of the members could use the automobile at the same time, except, perhaps, for certain pleasure riding. In other words, from an average family of five or six, the interurban railway will be sure to derive a large amount of riding during any given year.

BANKER'S PREDICTIONS COME TRUE

But this is intended to be a record of the financing of the year. Not that the views of the bankers about the situation are not of great interest. They are. During the year, however, there was a series of notable papers on the economic outlook for electric railways and the prospects for financing. At the October convention T. N. Carver, C. W. Kellogg, Allen G. Hoyt, Fred Scheel and J. P. Harris all spoke about the outlook for the railways. Moreover, the financial condition of the industry was the topic at the afternoon session of the Midyear Meeting of the American Electric Railway Association at St. Louis on March 4. For the most part, these papers were economic in their treatment, but B. C. Cobb of Hodenpyl, Hardy & Company, did discuss the outlook for the future and referred to specific issues.

He said in conclusion that what he wanted to get into the minds of his hearers was that electric railway securities are now beginning to attract attention and many buyers heretofore not receptive are looking them up. He said that during the year up to the time he spoke the electric railways had all been successful in selling their bonds and short-term notes on a basis of from 6.25 per cent to 7 per cent in a highly competitive market. As he saw it the success of these companies undoubtedly would encourage others to enter the market, and as the public became acquainted with the improved financial condition of the electric railways the demand for their securities would increase. Is it logical, said he, that a railway bond issued by a road that is in a growing and prosperous community, one that earns more than two and one-half times its interest charges, should go begging? He said no; and when the investing public gets over its scare, it will not. The events of the year have proved Mr. Cobb to be correct. In fact, in the light of the events that have come to pass his words of last March were prophetic.

BIG INCREASE IN EQUIPMENT TRUST FINANCING

A very interesting development of the year was the increasing extent to which resort was made to the use of equipment trust obligations in connection with the purchase of new equipment. The amount of these security offerings and other financial matters connected with them are shown in an accompanying table. Notable among such issues were those secured and made by the Pacific Electric Railway, Los Angeles; the Detroit United Railway, the Memphis Street Railway, the Louisville Railway, the Connecticut Company, the Pittsburgh

PRINCIPAL ELECTRIC RAILWAY MATURITIES IN 1925 BASED ON DOW, JONES & COMPANY'S COMPILATION

Due	Corporation:	Rate	Amount
Jan. 1	Toledo, Fremont & Norwalk R.R. 1st	6½	\$1,115,000
Jan. 1	Nashville Street Ry. 1st	5	907,000
Jan. 1	Int. Rapid Trans. eq. tr. B.	6½	450,000
Jan. 1	Reading & Womelsdorf E. Ry. 1st	5	400,000
Jan. 1	Eastern Mass. St. Ry. serial	6	300,000
Jan. 1	Wilkes-Barre & Wyom. Val. T. clt.	5	245,000
Jan. 2	Jefferson Traction 1st	6	441,000
Jan. 15	Minn., Lyndale & Minnetonka Ry.	7	5,000,000
January total			\$8,858,000
Feb. 1	Metropolitan Railroad 1st	5	\$1,809,000
Feb. 1	Sohaykill Electric Ry. 1st	6	293,000
Feb. 1	Phila. Rap. Transit eq. tr. G.	5½	237,500
Feb. 1	Pittsburgh Rys. car tr.	6	200,000
February total			\$2,539,500
Mch. 1	Butte Electric Ry. 1st	5	\$700,000
Mch. 1	Worcester Cons. St. Ry. ext.	7	700,000
Mch. 1	Berkshire Street Ry. deb.	5	200,000
Mch. 15	Inter. Rapid Transit eq. tr. A.	6	280,000
March total			\$1,880,000
May 15	London (Ont.) Street Ry. deb.	5	\$475,000
May total			\$475,000
June 1	Worcester & So'bridge St. Ry. 1st	4½	\$200,000
June 15	Chi., Nor. Shore & Milw. 1-yr.	6	3,500,000
June total			\$3,700,000
July 1	Winnipeg, Selk & L. Wiun Ry. ref.	5	\$1,000,000
July 1	Winona Interurban Ry. 1st	5	750,000
July 1	Chatham, Wall & L. Erie Ry. 1st	5	694,500
July 1	Lima, Pind & Toledo Ry. 1st	5	324,000
July 1	International Railway clt.	7	226,000
July total			\$2,994,500
Aug. 1	Galveston-Houston Elec. nts. A.	7	\$1,700,000
Aug. 1	Galveston-Houston nts. B.	7	500,000
Aug. 1	Phila. Rapid Transit eq. tr. G.	5½	237,500
August total			\$2,437,000
Nov. 1	Scranton Railway gen. ext.	7	\$1,000,000
Nov. 1	Inter. Rapid Transit eq. tr. C.	6	570,000
November total			\$1,570,000
Dec. 1	Phila. Rapid Transit 2-yr.	6	\$3,500,000
Dec. 15	Phila. Rap. Transit eq. tr. H.		270,000
December total			\$3,770,000
Grand total			\$28,224,000

Railways, the Philadelphia Rapid Transit Company and the Buffalo & Erie Railway.

The Louisville issue was placed with the public on a 6 per cent basis, the Memphis issue on a 6.25 per cent basis, the Pittsburgh issue on a 5.22 to 6 per cent basis, the Pacific Electric Railway issue on a 5.08 average yield, the Connecticut Company issue on a 6 per cent basis, the Detroit United issue on a 5 to 6 per cent basis, the Philadelphia Rapid Transit issue on a 4.74 per cent to 5.50 per cent basis and the Buffalo & Erie Railway issue on a 4½ to 6 per cent basis. Incidentally, the placing of these issues shows the growing tendency of the electric railways to modernize and merchandise. The saving in operating expenses through the use of thoroughly modern equipment is an important factor that often makes it possible for companies to amortize the purchase price of new equipment in a period of a comparatively few years.

A recapitulation of the equipment trust offerings shows that in the last year 617 cars have been bought and secured under this plan and a total of 272 motor buses have been similarly financed. Moreover, information obtained about the details of these offerings shows that the practice has been to pay not less than 25 per cent of the estimated cost of the equipment in cash, while in the Louisville case, the proportion in cash was about 40 per cent. The number of cars purchased by the Louisville Railway was not specified. The net cost of the equipment was \$375,000, of which the Louisville Railway made a cash initial payment of \$150,000. In

the case of the Memphis Street Railway the cost of equipment was \$459,000, of which 25 per cent was paid in cash. This equipment consisted of 40 cars of the 55-passenger double-truck type. The cost of the equipment for the Pittsburgh Railways was more than \$3,600,000. The company paid approximately \$600,000, or 16 per cent in cash. This equipment consisted of 60 single-end, center-entrance, semi-convertible, double-truck, semi-steel cars, 16 semi-steel passenger cars, and 65 semi-steel cars of the one-man, two-man types.

The equipment for the Southern Pacific Company, according to estimates of the Railroad Commission of California, cost \$1,632,039. Of this sum about \$327,408, or 20 per cent, was paid in cash. The equipment here secured included five electric locomotives, 50 center-entrance steel cars, 12 one-man, two-man cars, and six electric motor coaches for interurban service.

In the case of the Connecticut Company the total cost of the equipment originally was \$906,968. The equipment was bought in 1918 for the Connecticut Company with funds furnished by the United States Housing Corporation. Engineers reported the value of the cars at the time of the offering by the bankers in July was \$770,000. The amount of the equipment trust issue in this case was \$450,000, or approximately 60 per cent, showing that approximately 40 per cent had been paid in cash. Since 1915 the company has issued a total of \$1,797,500 of equipment trust notes, on which \$1,170,000 has been paid in July, 1924, leaving \$627,500 outstanding at that time. The equipment secured by this issue was 50 convertible steel passenger cars, with a capacity of 56 passengers each, and 20 convertible steel passenger cars with a capacity of 32 passengers each.

The Detroit United equipment cost \$1,630,000, of which \$330,000 was paid in cash. In offering this issue for public subscription the bankers emphasized the fact that 52 per cent of the certificates matured during the first 3½ years. The equipment secured by the deed of trust in this case consists of eight heavy interurban cars, six interurban passenger chair cars, 15 double-truck, 52-passenger one-man cars, 50 trail box cars, 25 single-deck, 29-passenger buses, 10 double-deck buses and 40 29-passenger single-deck, four-cylinder coaches.

The Philadelphia Rapid Transit Company equipment cost \$3,772,000. The par value of the certificates represents approximately 75 per cent of the entire cost of the railway cars, but less than 70 per cent of the cash cost of motor vehicle equipment. This equipment consists of 100 standard double-truck cars, 125 double-deck motor coaches, 77 single-deck motor coaches, and 11 service trucks.

The Buffalo & Erie Railway equipment will cost not less than \$285,000, which is more than 142 per cent of the face value of the certificates. The issue will be secured by deposit with the trustee of 14 double-truck passenger cars, four single-truck passenger cars and two snowplows. The 18-passenger cars are to be of the "Lexington" type designed for high-speed service.

NOT ALL EQUIPMENT TRUSTS WERE PLACED DIRECT WITH PUBLIC

By no means do the figures for equipment trusts issued to the public cover the total of financing of this kind. There is every reason to believe that there was a fairly larger volume of purchases financed by means of similar obligations placed direct with the car build-

DETAILS OF NEW BOND AND NOTE FINANCING IN AMOUNTS OF MORE THAN \$200,000 OFFERED PUBLICLY DURING 1924

Issue	JANUARY	Sale Price	Maturity	Yield	Amount
Louisville Railway car trust 6 per cent gold certificates.....	100	and interest	{ Serially 1924-1934 }	6	\$230,000
Market Street Railway first mortgage 7 per cent sinking fund bonds.....	100	and interest	1940	7	13,000,000
Philadelphia Rapid Transit Company real estate first mortgage 6 per cent.....	100	and interest	1944	6	2,500,000
Memphis Street Railway equipment trust 6 per cent certificates.....	100 to 98.16	and interest	{ Serially 1924-1933 }	6 to 6.25	344,000
Maryland Electric Railways 6½ per cent first and refunding mortgage gold bonds.....	100	and interest	1957	6½	4,000,000
MARCH					
Boston Elevated Railway 6 per cent gold bonds.....	103	and interest	1933		3,000,000
Key System Transit Company first mortgage 6 per cent bonds.....	99½	and interest	1938	6.05	2,500,000
APRIL					
Key System Transit Company general and refunding mortgage 5 per cent.....	78	and interest	1938	7.75	1,118,000
Holyoke Street Railway first mortgage 6 per cent bonds.....	102	and interest	1938	5.75	550,000
West Penn Railways 6½ per cent gold debentures.....	99	and interest	1927	6.87½	3,500,000
Grand Rapids Railway 7 per cent sinking fund gold bonds.....	99½	and interest	1939	7+	3,200,000
North Hudson County Railway improvement mortgage 5 per cent bonds (Public Service Ry.)	See note (a)		(b) 1926	6	1,291,000
Pittsburgh Railways 6 per cent car trust bonds.....	100.50 to 100	and interest	1925-1939	5.22 to 6	3,000,000
(c) Pacific Electric Railway 5 per cent equipment trust certificates.....	99½	and interest	1925-1939	5.08 av. yield	1,305,600
JUNE					
Chicago Rapid Transit Company first and refunding mortgage, 6½ per cent gold bonds.....	94½	and interest	1944	7+	6,500,000
Hestonville, Mantua & Fairmount Passenger Railroad 5½ per cent gold bonds.....	100	and interest	(c) 1934	5½	1,250,000
Detroit United Railway first mortgage and collateral trust bonds.....	99	and interest	1929	6.20	9,000,000
Chicago, North Shore & Milwaukee Railroad 6 per cent gold notes.....			1924	....	3,500,000
JULY					
Boston Elevated Railway ten-year 5½ per cent gold bonds.....	101.25	and interest	1934	5.35	1,581,000
Connecticut Company 6 per cent equipment trust 6 per cent gold notes.....	100	and interest	{ Serially 1924-1934 }	6	450,000
Winona Service Company (Winona Interurban Railway).....					600,000
OCTOBER					
Chicago Rapid Transit Company first and refunding mortgage 6½ per cent bonds.....	94½	and interest	1944	7 (d)	2,500,000
Minneapolis Street Railway 5½ per cent gold notes.....	100	and interest	1928	5½	5,000,000
NOVEMBER					
Erie Railways 6 per cent gold bonds.....	95	and interest	1954	6½	1,000,000
Detroit United Railways equipment trust 6 per cent certificates.....	100.40 to 100		1925 to 1934	5 to 6	1,000,000
DECEMBER					
Montreal Tramways first and refunding mortgage 5 per cent bonds.....	95	and interest	1941	5.45	3,266,000
Philadelphia Rapid Transit Company 5½ per cent equipment trust certificates.....	100.75 to 100		{ Serially 1925-1934 }	4.75 to 5.50	2,700,000
Chicago, North Shore & Milwaukee Railroad first and refunding mortgage 6 per cent (series A)	98	and interest	1955	6.15	7,000,000
Buffalo & Erie Railway equipment trust gold certificates.....	100 to 100½		1925-34	4½ to 6	200,000
Total.....					\$84,884,600

(a) Extended at 101 per cent with option to holder to redeem at par.

(b) Extended from 1924.

(c) Extended issue.

(d) Total issue \$17,640,000 and included five electric locomotives, 50 center-entrance steel street cars, 12 one-man steel street cars and six electric motor coaches, estimated by State Railroad Commission to cost \$1,632,039, but mortgaged for 80 per cent of purchase price.

ers. For instance, the Richmond Light & Railroad Company, Staten Island, is known to have executed car trust certificates to the amount of \$250,000 direct to the car builders in part payment for new rolling stock. In this case twenty double-truck cars found to be unsuitable for meeting present conditions were replaced with 25 one-man, two-man cars. The cost of this equipment was \$334,375. These certificates bear interest at the rate of 6½ per cent and the company agreed to redeem them at the rate of \$25,000 a year. In this case a financial expert retained by the company reported that in view of the relatively small number of the equipment units upon which the proposed issue of the certificates would be placed, and considering the not so well standardized and stabilized type of equipment in the electric street railways, as evidenced by this present specific instance of the proposed retirement of cars which are by no means old or worn out, an interest rate as low as upon trunk-line railroad equipment could not reasonably be expected. It is reasonable to assume, said this authority, that the management of this company has obtained the lowest rate which in the exercise of business judgment it has been able to negotiate.

A somewhat similar case was presented in Trenton. There approval was granted in August by the Board of Public Utility Commissioners to the car trust agreement entered into on July 8 by the Trenton & Mercer County Traction Corporation, Trenton, N. J., with the J. G. Brill Company. In the same action the board authorized the railway to issue 10 serial notes aggregating \$409,943. Of this amount \$242,122 is listed as the principal and \$70,821 as the interest thereon. The application of the railway to the commission was the outgrowth of the corporation's plan to add 20 new cars to the service—an improvement already approved by the commissioners.

TENDENCY TO STRENGTHEN SINKING FUND REQUIREMENTS

Another change noted during the year was the tendency to increase the sinking fund provisions. Both the San Francisco refunding issue and the Detroit equipment issues illustrate this. These are all matters of public record. In the San Francisco case the company has covenanted to provide a sinking fund of \$500,000 a year from Jan. 1, 1925, through 1932. Bonds are to be purchased in the open market at not to exceed their redemption prices, or if not so obtainable to be recalled and kept alive until Jan. 1, 1933, and their interest used to acquire additional bonds. The bonds then held in the sinking fund will be canceled and thereafter the company will provide a quarterly sinking fund of \$300,000 a year until maturity for like purchase or redemption. The bonds acquired will be kept alive and the interest thereon will be added to the sinking fund. The operation of the sinking funds, assuming bonds retired at call price, will reduce this issue to \$8,075,000 on Jan. 1, 1933, and to \$5,460,000 on Jan. 1, 1940. Proceeds from the sale of any mortgage property are to be added to the fixed sinking payments.

On the other hand, the Maryland Electric Railway issue calls for a sinking fund of 1 per cent of all the first and refunding mortgage bonds, series A, from time to time outstanding. The first payment is to be made on Jan. 1, 1925. This is in addition to a fund of not less than 1 per cent per annum for improvements, depreciation and obsolescence. In the \$6,500,000 Chicago Rapid Transit issue, the sinking fund does not

begin to operate until Jan. 1, 1929, but on the first days of January and July of that year and on the similar days each year thereafter an amount equal to one-half of 1 per cent of the total amount of the bonds must be provided for the sinking fund. In the case of the Boston issue of \$1,581,000 emphasis was laid on the fact that the company is charging 24 per cent of the total railway revenue to maintenance and depreciation. The mortgage by which the \$7,000,000 of the Chicago, North Shore & Milwaukee Railroad first and refunding bonds are secured provides for a sinking fund beginning Dec. 1, 1925, with semi-annual payments equal to one-half of 1 per cent of the principal amount of the bonds then outstanding under the mortgage and underlying bonds at such times in the hands of the public.

FINANCING OF SPECIAL IMPROVEMENTS ARRANGED

It will be recalled that in the review of the financial situation in the *ELECTRIC RAILWAY JOURNAL* for Jan. 5, 1924, reference was made to the possibility of the railways making loans on a particular improvement, especially when such improvement involved the development of real estate. It was explained at that time that the carhouse, shop or terminal might be financed by a distinct loan where the buildings were located where there was a real chance of appreciation in land value. In this connection, it is interesting to note that loans along these lines were brought out during the year by both the Indianapolis & Cincinnati Traction Company and the Philadelphia Rapid Transit Company.

The Indianapolis & Cincinnati Traction Company was anxious to rehabilitate the entire line, but the matter of finances presented an obstacle which was considered insurmountable by many who analyzed the situation. A plan, however, was finally devised by President Charles L. Henry for extending the principles of the equipment trust method commonly used for financing the purchase of rolling stock to include substation equipment and feeder lines as well. J. F. Wild & Company, a local investment banking firm, agreed to finance the project on the basis of such an equipment trust through the sale of securities to the amount of 80 per cent of the total required, provided that the remaining 20 per cent could be raised in such a way that these securities became a first lien on the total amount of the trust equipment. The necessary additional 20 per cent was advanced by a small group of bondholders of the road who had faith in the ultimate result of the improvement and agreed to accept a second lien as security, in order to make the improvement possible. Preferred stock paying 6 per cent was issued by an intermediate company through which the details of the matter were arranged. The stock comprises two series, covering the 80 per cent first lien and the 20 per cent second lien, respectively. As explained in the elaborate series of articles the first of which was published in the *ELECTRIC RAILWAY JOURNAL* for July 26, page 113, these securities were all handled on a 10 per cent brokerage basis, and the total funds required were banked before any orders were placed with the manufacturers.

Extension of the equipment trust method of financing to the purchase of substation and feeder equipment made it important to avoid any questions or complications as to title to substation buildings or equipment. This was done by purchasing land sites adjacent to the railway right-of-way for the erection of the substation buildings. Although each of the new stations adjoins an old transformer station which was suitable physi-

cally for conversion into a rotary converter substation, the question of complication in title made it desirable to adopt the plan of purchasing sites off existing railway property and erecting new buildings. However, by making the new structures as simple as possible, consistent with security and fireproof construction, the total cost of land and buildings was held to within \$20,000 of the estimated cost of making changes in existing transformer station buildings.

All feeder cable strung along the right-of-way on the railway's poles, as well as other property purchased with equipment trust funds, was plainly tagged at frequent intervals for identification. Annual rental and installment payments by the railway are to be made at a rate which will wipe out the total cost of the new equipment at the end of ten years.

The Philadelphia Rapid Transit Company loan was strictly a real estate first mortgage in which an issue of 6 per cent bonds was secured by a first mortgage on three modern car terminals of brick and concrete construction advantageously located in the northern, central and southern sections of the city of Philadelphia. It was explained that the terminal properties on which these bonds were secured by a first mortgage had a value of \$4,083,040, and that the real estate itself had a value of \$1,720,000, making a total real estate value for all of the property of more than \$5,800,000.

Reference has been made to the fact that the \$2,098,000 of the Boston Elevated Railway 6 per cent 10-year bonds was sold at 103 and interest to yield about 5.60 per cent. The Boston Elevated Railway is under public management and operation, pursuant to an act of the Legislature of Massachusetts. This is regarded as having a favorable effect on the prices at which the company is able to do its financing. Aside from this, however, early in the present year, the road's bonds for the first time in 5 years had the advantage of a savings bank market. In other words, the bonds were returned to the so-called legal list. In 1905 the company was able to dispose of an issue of \$7,500,000 bearing 4 per cent interest at 103.692.

In 1923 the largest maturity was \$13,115,000 of secured notes of the New England Investment & Security Company. This issue came due last April. The total originally was \$16,250,000 issued to the New York, New Haven & Hartford in 1909 in settlement for repairs and other work. Since then \$3,135,000 has been received and canceled. This is largely an intercompany matter and it is understood that the refunding or extension of these notes will soon be ready for consideration. The Market Street Railway refunding issue has been referred to before. The \$1,500,000 of bonds of the Boston Elevated Railway which became due on March 1 were refunded and were included in the issue of \$2,098,000 of 10-year 6 per cent bonds issued at that time. The \$5,098,000 additional bonds were to cover expenditures on new shops in Everett. The \$1,581,000 of bonds which became due on Aug. 1, 1924, were refunded by a like amount of 10-year 5½ per cent bonds on that date. The first and refunding mortgage 4 per cent bonds of the Hoosac Valley Street Railway which matured on Sept. 1, 1924, were extended to Sept. 1, 1929, with interest at 7 per cent per annum.

As for the issues of stock sold direct to the investing public the more of these issues that are safely held by the public the better it will be for the electric railway. The investment bankers are agreed upon this. There are elements of danger, however, in such sales.

This was forcefully brought out by Ralph S. Child of Bonbright & Company in his statement on customer ownership made before the New Jersey Public Utility Association and abstracted in the *ELECTRIC RAILWAY JOURNAL* for Dec. 6, page 967. His advice is so pertinent and so recent that it has seemed advisable to repeat in part what he said:

"It is vitally necessary to the continuance of the strong position of the public utility industry that there be no failure in the payment of dividends on the part of any company which has sold preferred stock to its customers. Should such a failure occur it would reflect on the entire industry and might bring out complications which would be very far-reaching and possibly have disastrous results."

The electric railways are looking ahead. As a matter of fact they are taking some pages out of the book of experience of the steam railroads by resorting to the use of the blanket open-end mortgage to permit financing to be carried on continually with the end in view of eventually having probably one general lien upon the property. Thus early in November creation of a \$7,000,000 first and refunding issue was approved by the Worcester Consolidated Street Railway as a means of anticipating securities which mature in 1925 and at subsequent dates. Next year this company will have to meet \$700,000 in maturities and within the next three years a total of \$3,083,000 in maturities. This was a purely constructive move on the part of the railway in keeping up with the general financial tendency in recent years in connection with such matters, for it has been left to the directors to sell the bonds in series with different coupon rates, depending entirely upon the state of the bond market at the time the money is needed.

Among the banks and investment houses which have participated as principals in the work of placing the various issues of electric railway companies with the public during 1924 there appear the following names:

HOUSES OF ISSUE

Louisville—Fidelity & Columbia Trust Company.

San Francisco—Wells Fargo Bank & Union Trust Company; Anglo & London Paris National Bank.

New York—Dillon, Read & Company; Ladenburg, Thalmann & Company; Harris, Forbes & Company; Alexander Brown & Sons; E. H. Rollins & Sons; Remick, Hodges & Company; Paine, Webber & Company; Halsey, Stuart & Company; Federal Securities Corporation; Spencer Trask & Company; Hodenpyl, Hardy & Company; Bonbright & Company; Kuhn, Loeb & Company; the National City Company; Curtis & Sanger; White, Weld & Company; Blodgett & Company; Myron S. Hall & Company.

Philadelphia—Drexel & Company; Harper & Turner; Bown & Company.

Pittsburgh—Union Trust Company.

Hartford—Putnam & Company.

Indianapolis—Aetna Trust & Savings Bank; J. F. Wild & Company.

Detroit—Watling, Lurchen & Company.

Cleveland—Union Trust Company.

It is only fair to say that many of the facts previously set down would not have been possible to obtain except for the help of the bankers themselves. They gave freely of their time to supply facts for the article and made many constructive suggestions. In particular, acknowledgment is made to the officers of the National City Company, New York, who placed their own records at the disposal of the *ELECTRIC RAILWAY JOURNAL* in connection with the work of preparing the table of security issues placed with the public during the year.

\$117,000,000 Less Involved in Roads Now in Receivership

Financial Affairs of Eighteen Companies Straightened Out During the Year — Twelve Companies Thrown into Receivership — Mileage Operated by Receivers Is Decreased 338 Miles from That at End of 1923

DURING the past year the financial status of electric railways has been generally favorable. This has been reflected even in the weaker properties. In fact, the situation was so good in the earlier part of the year that it appeared that the number of receiverships for the year and the value of the securities involved would be less than for 1923. The uncertainty due to the developments of the Presidential campaign, particularly with the dire prophecies of results to follow the election of a radical candidate, caused a falling off in general business that was nation-wide. Incidentally there was a loss in electric railway traffic great enough that some of the weaker roads were unable to withstand the pressure, and receiverships resulted.

Even with the general situation as it was, the record would have been almost as good as that for last year had not application been made for a receiver for the Union Traction Company of Indiana in the closing hours of 1924. This road, an important property, which consists of 455 miles of interurbans in central Indiana, is capitalized at \$26,181,000. Adding it to the list of new receiverships threw the totals, both for the amount of track and the securities involved, considerably above those for 1923. It also brought the total number of companies thrown into receivership during the year up to 12, or the same number as for the year previous.

Next to the Union Traction Company in size among those entering receivership during the year is the Michigan Railroad, which operates 159.44 miles of interurban railway in southern Michigan. The securities involved total \$12,050,000. Other important roads going into receivership were the Joplin & Pittsburg Railway, with 94.52 miles of track and \$10,078,500 of securities, and the Columbus, Newark & Zanesville Railway, with 91.05 miles and \$6,729,000 of securities. All told, the 12 companies include 1,022 miles of track and \$64,000,000 of securities.

Included along with the list of railways in receivership is listed the Charleston-Isle of Palms Traction Company, Charleston, S. C. Technically, however, this

road is not in receivership as a trustee has been appointed instead. The procedure is only slightly different, however, and the road is being reorganized, so that for that reason it has been put in the table.

Contrasted with this, the financial difficulties of 22 companies were straightened out in whole or in part. In 18 of these cases the receiverships were terminated, the companies totaling 1,608 miles of track and \$174,000,000 in securities. The net result of the receivership operations is thus decidedly favorable, the properties

ELECTRIC RAILWAY RECEIVERSHIPS—1924

	Miles of single track involved	Outstanding Securities—		
		Stocks	Bonds	Receivers' Certificates
United Traction Co. of Ind., Anderson, Ind.....	455.0	11,500,000	14,681,000	None
Kansas City, Kaw Valley & Western Ry. Co., Bonner Springs, Kans.	42.31	73,500	1,374,500	None
Joplin & Pittsburg Ry. Co., Pittsburg, Kans.....	94.52	\$7,000,000	\$3,078,500	None
Millford, Attleboro & Woonsocket Street Ry. Co., Millford, Mass...	29.73	315,000	300,000	None
Grand Rapids, Holland & Chicago Ry., Holland, Mich.....	76.40	1,324,700	1,500,000	None
Michigan Railroad Co., Jackson, Mich.....	159.44	4,000,000	8,050,000	None
Ithaca Traction Corporation, Ithaca, N. Y.....	11.47	400,000	763,000	None
Long Island Electric Ry Co., New York, N. Y.....	24.97	600,000	600,000	None
Port Jervis Traction Co., Port Jervis, N. Y.....	4.78	30,000	70,000	None
Maumee Valley Ry. Co., Perrysburg, Ohio.....	23.21	7,500	345,000	None
Columbus, Newark & Zanesville Ry. Co., Springfield, O.....	91.05	2,025,000	4,704,000	\$190,000
Charleston—Isle of Palms Traction Co., Charleston, S. C.....	9.00	527,000	250,000	.....
Total for 1924 (13 companies)	1,021.88	28,489,700	35,716,000	190,000

released to their owners representing nearly three times as much capital as those that went into receiverships.

The leading property to have the receivership terminated during the year was the Pittsburgh Railways. This city property, with 600 miles of track and \$94,000,000 of securities, was put in such excellent condition by the receiver that it was possible to return it to its original owners without the necessity for a reorganization. In the period of the receivership, which lasted nearly 6

TABLE I—RECORD OF ELECTRIC RAILWAY RECEIVERSHIPS

Year	Number of Companies	Miles of Single Track Involved	Outstanding Securities—	
			Stock	Bonds
1909	22	558.00	\$29,962,200	\$22,325,000
1910	11	696.61	12,629,400	75,490,735
1911	19	518.90	29,533,450	38,973,293
1912	26	373.58	20,410,700	11,133,800
1913	18	342.84	31,006,900	47,272,200
1914	10	362.39	35,562,550	19,050,460
1915	27	1,152.10	40,298,050	39,372,375
1916	15	359.26	14,476,600	10,849,200
1917	21	1,177.32	33,918,725	33,778,400
1918	29	2,017.61	92,130,388	163,257,102
1919	48	3,781.12	321,259,354	312,915,104
1920	19	1,065.31	28,758,455	72,283,575
1921	19	986.42	32,909,525	36,177,800
1922	14	695.43	18,140,150	20,304,400
1923	12	333.63	8,332,100	14,707,066
1924	12	1,021.88	28,489,700	35,716,000

TABLE II—RECORD OF ELECTRIC RAILWAY FORECLOSURE SALES

Year	Number of Companies	Miles of Track Involved	Outstanding Securities—		
			Stocks	Bonds	Receivers' Certificates
1909	21	488.00	\$22,265,700	\$21,174,000	(a)
1910	22	724.36	19,106,613	26,374,075	(a)
1911	25	660.72	91,354,800	115,092,750	(a)
1912	18	267.18	14,197,300	10,685,250	(a)
1913	17	302.28	15,243,700	19,094,500	(a)
1914	11	181.26	26,239,700	44,094,241	(a)
1915	19	308.31	30,508,817	16,759,997	(a)
1916	19	430.14	13,895,400	22,702,300	(a)
1917	26	745.19	27,281,900	27,313,045	(a)
1918	23	524.22	37,740,325	20,149,384	(a)
1919	29	2,675.48	89,893,400	79,836,738	\$42,300
1920	13	259.90	7,782,400	11,227,328	52,000
1921	13	777.97	33,642,255	30,863,526	5,000
1922	13	322.88	7,491,500	12,640,600	114,683
1923	15	927.45	118,077,959	110,638,250	12,265,000
1924	14	869.25	21,022,800	34,845,535	3,440,368

(a) Data not available.

Table IV—Electric Railway Receiverships as of Dec. 31, 1924

Name of Company	Year of Receivership	Miles of Single Track Involved	Capital Stock	Outstanding Securities Funded Debt	Receivers' Certificates
New England District					
CONNECTICUT					
Danbury & Bethel St. Ry., Danbury.....	1917	13.00	\$320,000	\$588,500	\$100,000
Hartford & Springfield St. Ry., Hartford.....	1918	48.00	785,000	961,000	None
MASSACHUSETTS					
Connecticut Valley St. Ry., Greenfield, Mass.....	1921	47.05	620,000	580,000	10,000
Northern Massachusetts St. Ry., Greenfield, Mass.....	1921	44.09	500,000	500,000	40,000
Millford, Attleboro & Woonsocket St. Ry., Springfield.....	1924	29.73	315,000	300,000	None
NEW HAMPSHIRE					
Portsmouth, Dover & York St. Ry., Portsmouth (1).....	1917	12.00	.....	707,000	30,000
VERMONT					
Barre & Montpelier Trac. & Pwr. Co., Montpelier.....	1920	9.75	120,000	100,000	None
Net receiverships Dec. 31, 1924	7 cos.	203.62	\$2,660,000	\$5,736,500	\$180,000
North of the Ohio and East of the Mississippi					
ILLINOIS					
Alton, Granite & St. Louis Trac. Co., Alton.....	1920	62.00	\$3,189,000	\$3,000,000	None
Chicago & Interurban Trac. Co., Chicago.....	1922	50.00	1,000,000	1,350,000	None
Peoria Ry. Terminal Co., Peoria	1922	11.40	1,000,000	2,444,000	None
INDIANA					
United Traction Co. of Indiana, Anderson.....	1924	455.00	11,500,000	14,681,000	None
Beech Grove Trac. Co., Beech Grove.....	1917	3.90	150,000	100,000	None
Ft. Wayne, Van Wert & Lima Trac. Co., Ft. Wayne.....	1921	61.63	1,000,000	1,470,000	None
MICHIGAN					
Grand Rapids, Holland & Chicago Ry., Holland.....	1924	76.40	1,324,700	1,500,000	None
Houghton County Trac. Co., Houghton.....	1921	32.15	957,200	660,000	None
Michigan R.R., Jackson.....	1924	159.44	4,000,000	8,050,000	None
NEW JERSEY					
North Jersey Rapid Transit Co., Hoboken.....	1912	18.00	800,000	800,000	None
Morris County Trac. Co., Morristown.....	1923	68.98	300,000	4,193,066	None
NEW YORK					
Buffalo & Lackawanna Trac. Co., Buffalo.....	1918	8.80	55,000	1,000,000	None
Hamburg Railway, Buffalo....	1920	21.72	(2)	(2)	None
New York & Long Island Trac. Co., Hempstead.....	1923	50.76	1,000,000	1,000,000	None
Hornell Trac. Co., Hornell.....	1917	10.90	117,900	150,000	2,000
Ithaca Trac. Corp., Ithaca.....	1924	11.62	400,000	763,000	None
New York & Queens County Ry., Jackson Heights.....	1923	43.65	3,235,000	1,500,000	None
Manhattan & Queens Trac. Corp., Long Island City.....	1917	21.20	20,000 (3)	2,090,000 (4)	None
Brooklyn Heights R.R., Bklyn.	1919	5.12	200,000	250,000	None
Long Island Elec. Ry., New York	1924	24.97	600,000	600,000	None
Steinway Ry., Long Island....	1922	31.11	None	1,500,000	None
New York Rys., New York.....	1919	80.00	17,495,060	48,699,175	None
Staten Island Midland Ry., New York (7).....	1920	28.68	1,000,000	1,000,000	3,000
Second Ave. Ry., New York....	1908	26.35	1,862,000	5,720,000	3,140,000
Ogdensburg St. Ry., Ogdensburg	1922	7.74	150,000	150,000	None
Penn Yan & Lake Shore Ry., Penn Yan.....	1918	8.50	94,000	100,000	None
Port Jervis Trac. Co., Port Jervis.....	1924	4.78	50,000	70,000	None
Westchester St. R.R. Co., White Plains.....	1920	17.92	700,000	168,000	17,400
OHIO					
Cincinnati, Lawrenceburg & Aurora Elec. St. R.R., Cincinnati	1913	31.67	808,900	750,000	None
Dayton, Springfield & Xenia So. Ry., Dayton.....	1923	27.97	500,000	422,400	None
Cincinnati and Dayton Trac. Co., Hamilton.....	1920	91.07	1,250,000	3,250,000	25,000
Cleveland, Alliance & Mahoning Valley R.R., Ravenna.....	1920	46.00	1,100,000	1,100,000	8,000
Dayton, Covington & Piqua Trac. Co., West Milton.....	1922	34.00	1,150,000	550,000	18,000
The Hoeking-Sunday Creek Trac. Co., Nelsonville.....	1923	14.99	223,000	300,000	None
Columbus, Newark & Zanesville Trac. Co., Springfield.....	1924	91.05	2,025,000	4,704,000	190,000
Indiana, Columbus & Eastern Trac. Co., Springfield.....	1921	201.49	4,025,000	7,900,000	200,000
Toledo & Western R.R., Toledo (5)	1921	89.00	2,000,000	2,000,000	None
Ohio River Elec. Ry. & Power Co., Pomeroy (7).....	1919	12.70	300,000	315,000	None
Maumee Valley Ry., Perrysburg (7).....	1924	23.21	1,000,000	800,000	None
PENNSYLVANIA					
North Branch Transit Co., Bloomsburg.....	1915	30.00	500,000	532,500	83,000
Slate Belt Transit Co., Pen Argyl	1922	18.00	180,000	180,000	None
Net receiverships Dec. 31, 1924	41 cos.	2,114.87	\$67,241,760	\$125,812,141	\$3,686,400
South of the Ohio and East of the Mississippi					
DISTRICT OF COLUMBIA					
Washington-Virginia Ry.....	1923	40.00	\$2,378,300	\$5,614,000	None
FLORIDA					
Jacksonville Trac. Co., Jacksonville.....	1919	65.00	1,500,000	3,270,200	\$98,469
Pensacola Elec. Co., Pensacola..	1920	24.49	1,100,000 (6)	1,721,770 (6)	None

(1) Remainder of property scrapped.

(2) Merged with Buffalo & Lake Erie Traction Company in 1906.

(3) Subscription rights only.

(4) Unfunded debt.

(5) Property has been sold, but receiver not yet discharged.

(6) Figures for total property. Railway value cannot be separated.

(7) As included in last year's report.

years, a great deal of important rehabilitation work was carried out and the road was modernized in nearly every department, so that it is today in far better condition than when it was thrown into receivership in 1918.

Another important road to emerge from receivership was the Cleveland, Southwestern & Columbus Railway, an interurban running out of Cleveland. This property was sold and reorganized as the Cleveland Southwestern Railway & Light Company. The difficulties of the Buffalo & Lake Erie Traction Company were finally adjusted, the property being reorganized after a foreclosure sale. In this case the interurban section of the road, operating between Buffalo, N. Y., and Erie, Pa., was segregated from the city property in Erie, two separate companies being formed. The Birmingham Railway, Light & Power Company and the Birmingham-Tidewater Railway, which have been in receivership since 1919, were reorganized as the Birmingham Electric Company.

The affairs of the Ohio Electric Railway, which went into receivership in 1921, have finally been wound up with the organization of the Lima-Toledo Railroad.

Of the companies which remain in receivership, the principal ones are two Missouri properties, the United Railways of St. Louis and the Kansas City Railways. The former has 461 miles of track and the latter 315 miles. Several times during the past year it has seemed probable that the roads would be restored to their owners, but each time the negotiations have been held up. Both properties have been making good showings, and in both cases large sums have been spent in rehabilitation, so that physically they are in excellent shape. It seems entirely probable that both properties will come out of receivership during the present year.

Another good-sized city property remaining in receivership is the Denver Tramway. In this case also the lifting of the receivership has been deferred. Negotiations are progressing, however, and there is some possibility of terminating the difficulties of the property. The principal difficulty has been in reaching an agreement as to the valuation between the owners of the securities and the city.

The only other property of over 100 miles included in the list is the Indiana, Columbus & Eastern Traction Company, which has been in

receivership since 1921. This is an interurban line in Ohio and Indiana which operates over 200 miles of track. Conditions have not been so favorable in this case as in the ones previously mentioned, and it is doubtful if the affairs of the receiver who has this property in charge can be wound up during the present year.

The readjustment of transportation methods is still going on, as is evidenced by the abandonments of railway lines. Altogether 23 properties totaling 225.52 miles abandoned their tracks during the year. Nearly all of these are small interurban lines which have felt the pressure of competition with buses and private automobiles so keenly that they have not been able to make expenses and interest on the funded securities. Four of these roads were over 20 miles in length, the longest being the Milford, Woonsocket & Attleboro Street Railway of Springfield, Mass., with 29.75 miles. The other three in this classification were the Shore Line Electric Railway of Norwich, Conn., 28.22 miles; the Pennsylvania & Ohio Traction Company of Ashtabula, Ohio, 24 miles; and the Norwalk & Shelby Railroad of Norwalk, Ohio, 24 miles. These four roads comprise over half the abandoned track for the year.

The San Francisco-Oakland Terminal Railways, which was sold at foreclosure at the end of 1923, and which was included in last year's table of receiverships, did not, in fact, require the appointment of a receiver. It

was reorganized early in 1924 as the Key System Transit Company.

As is inevitable in preparing statistics of this sort, information is sometimes not available to complete the tables for the year. This is particularly true in the case of roads that have passed through receivership, as the officials of the original companies as well as the receivers have ceased their duties when the receiverships terminated and turned their duties over to new owners. Information received this year shows that there were several companies whose affairs were

Table IV—Receiverships as of Dec. 31, 1924 (Concluded)

Name of Company	Year of Receivership	Miles of Single Track Involved	Outstanding Securities		Receiver, Certificate
			Capital Stock	Funded Debt	
GEORGIA					
Valdosta St. Ry., Valdosta.....	1922	5.00	50,000	1,500	383
KENTUCKY					
Owensboro City R.R., Owensboro	1923	12.50	75,000	400,000	None
NORTH CAROLINA					
Alamance Ry., Burlington (8)...	1923	8.40	60,000	120	None
SOUTH CAROLINA					
Charleston-Isle of Palma Trac. Co., Charleston.....	1924	9.00	527,000	250,000	.....
Net receiverships Dec. 31, 1924.	7 cos.	164.39	\$5,690,300	\$11,252,590	\$98,852
West of the Mississippi					
COLORADO					
Denver Tramway Co., Denver..	1920	226.14	\$6,156,300	\$17,351,710	None
KANSAS					
Joplin & Pittsburg Ry., Pittsburg	1924	94.52	7,000,000	3,078,500	None
Kansas City, Kaw Valley & Western Ry., Bonner Springs.	1924	42.31	74,500	1,374,500	None
MINNESOTA					
St. Paul Southern Elec. Ry., Hastings.....	1918	17.54	658,225	425,400	None
MISSOURI					
Kansas City, Lawrence & Topeka Elec. Ry., Kansas City..	1919	12.00	250,000	400,000	None
Kansas City Rys., Kansas City.	1920	314.88	(9) 100,000	30,032,336	None
Missouri Elec. R.R., St. Louis..	1919	18.91	1,000,000	700,000	None
United Railways Co. of St. Louis	1919	460.93	41,296,000	50,690,000	4,200,000
Net receiverships Dec. 31, 1924.	8 cos.	1,187.23	\$56,201,025	\$104,052,446	\$4,200,000
RECAPITULATION FOR UNITED STATES					
Net receiverships Dec. 31, 1924.	63 cos.	3,670.11	\$131,793,085	\$244,858,677	\$8,165,250
(8) Property being dismantled July 1, (9) No par value. Nominal value of stock given.					

(8) Property being dismantled July 1, 1924. (9) No par value. Nominal value of stock given.

Table V—Receiverships Terminated and Foreclosure Sales During 1924

Receivers Discharged With or Without Foreclosure Sales or Following Abandonment	Miles of Single Track Involved	Outstanding Securities			Remarks
		Stocks	Bonds	Receivers' Certificates	
Birmingham Railway, Light & Power Co., Birmingham, Ala.....	154.70	\$4,232,800	\$8,737,872	\$397,388	Reorganized as Birmingham Electric Co.
Birmingham Tidewater Railway, Birmingham, Ala.	31.25	325,000	1,500,000	None	
Shore Line Electric Ry., Norwich, Conn.....	28.22	1,000,000	2,725,000	None	
Chicago & Oak Park Elevated R.R., Chicago, Ill.	22.66	100,000	6,148,863	\$2,210,000	Purchased by Chicago Rapid Transit Company at foreclosure sale.
DeKalb-Sycomore & Interurban Traction Co., DeKalb, Ill.....	6.5	.....	.....	.....	Abandoned. Data not available.
Winona Interurban R.R., Warsaw, Ind.....	70.0	750,000	2,343,700	None	Sold by receiver, reorganized as Winona Service Co.
Atlantic Shore Ry., Kennebunk, Me.....	49.93	1,000,000	1,746,250	None	Sold at foreclosure sale in 1923. Receiver discharged in 1924.
Concord, Maynard & Hudson St. Ry., Greenfield, Mass.....	18.15	235,000	230,000	None	Receiver discharged (Road abandoned in 1923).
Binghamton Railway Co., Binghamton, N. Y.....	50.25	978,995	2,576,950	None	Receiver discharged.
Coney Island & Brooklyn R.R., Brooklyn, N. Y.	52.88	2,983,900	6,232,000	None	Receiver discharged.
Pennsylvania & Ohio Trac. Co., Ashtabula, Ohio.	24.00	.....	.....	.....	Abandoned. Data not available.
Cleveland, Southwestern & Columbus Ry., Cleveland, Ohio.....	185.0	4,000,000	4,500,000	None	Sold and reorganized as Cleveland, Southwestern Railway & Light Co.
Lima-Toledo R.R., Lima, Ohio.....	82.90	11,000	2,254,000	None	Final portion of property of Ohio Electric Railway taken over by sale to the Lima-Toledo R.R. Co.
Norwalk & Shelby R.R., Norwalk, Ohio.....	24.00	125,000	150,000	None	Abandoned.
Northampton, Easton & Washington Traction Co., Easton, Pa.....	16.8	1,250,000	200,000	\$15,000	Sold at receivers sale and reorganized as New Jersey Interurban Co. in 1923. Receiver discharged in 1924.
Buffalo & Lake Erie Traction Co., Erie, Pa.....	168.0	7,500,000	7,066,000	760,000	Sold at foreclosure sale and reorganized as the Erie Railways Co. and the Buffalo & Erie Railway Co.
Ephrata & Lebanon Street Ry., Lebanon, Pa.....	23.0	220,000	203,000	None	Sold at foreclosure sale and reorganized as Lancaster, Ephrata & Lebanon Street Ry. Co.
Pittsburgh Railways Co., Pittsburgh, Pa.....	599.75	48,263,050	45,836,190	None	Receiver discharged.
Total of receiverships terminated (18 companies)	1,607.99	\$72,974,745	\$97,449,825	\$3,382,388	
Foreclosures but Receivers Not Yet Discharged					
Connecticut Valley Street Ry., Greenfield, Mass.	47.05	\$620,000	\$580,000	\$10,000	Sold at foreclosure sale and property liquidated. Receiver not yet discharged.
Northern Massachusetts St. Ry., Greenfield, Mass.	44.09	500,000	500,000	40,000	
Ohio River Elec. Ry. & Power Co., Pomeroy, Ohio.	12.70	300,000	315,000	None	
Cleveland, Alliance & Mahoning Valley R. R., Ravenna, Ohio.....	46.0	1,100,000	1,100,000	8,000	Sold at foreclosure sale. To be reorganized, but receiver not discharged.
Total of foreclosure sales without receivers' discharge (4 companies)	149.84	\$2,520,000	\$2,495,000	\$58,000	
Foreclosures Without Receiverships in 1924—None					

terminated in 1923 that were retained in the tables published in last year's Statistical Number. Among them were the Nassau Electric Railroad, Brooklyn, N. Y., with 136.1 miles of track and outstanding securities including \$105,925 of stocks, \$13,571,928 of bonds, and \$70,000 of receiver's certificates; and the Orange County Traction Company, Newburgh, N. Y., with 20.82 miles of track and securities of \$325,000 of stocks and \$780,000 of bonds. The former road was returned to its owners, the Brooklyn-Manhattan Transit Corporation, in 1923. The other property was sold under foreclosure proceedings in 1923 and was reorganized as the Newburgh City & Suburban Railway. In last year's table the Denver & Intermountain Railroad, Denver, Col., was included in the list of roads in receivership. This road, although a subsidiary of the Denver Tramway, which has been in receivership since 1920, was never itself in receivership, as information received this year states.

The Aurora, Elgin & Chicago Railroad of Aurora, Ill., has not been included in the list of railways in receivership this year. This property was sold during 1922, a portion of it being reorganized as the Aurora, Elgin

TABLE VI—ENTIRE PROPERTIES ABANDONED IN 1924

	Miles of Single Track	Stock	Bonds
Gadsden, Bellevue & Lookout Mountain Ry., Gadsden, Ala.....	3.1		
Shore Line Electric Ry., Norwich, Conn.....	28.22	\$1,000,000	\$2,725,000
Brunswick & Interurban Ry., Brunswick, Ga.....	6.25		
Caldwell Traction Co., Caldwell, Idaho.....	11.0		
DeKalb-Syemore & Interurban Traction Co., DeKalb, Ill.....	6.5		
Millford, Attleboro & Woonsocket Street Ry., Springfield, Mass.....	29.73	315,000	300,000
Kansas City Power & Light Co., Carrollton, Mo.....	2.0		
Glen Cove Railroad, Far Rockaway, N. Y.....	3.0	50,000	None
Great South Bay Ferry Co., Freeport, N. Y.....	2.92		
Wallkill Transit Co., Middletown, N. Y.....	12.84		
Suffolk Traction Co., Patchogue, N. Y.....	11.61		
Port Jervis Traction Co., Port Jervis, N. Y.....	4.78	30,000	70,000
Goldsboro Electric Railway Co., Goldsboro, N. C.....	3.5		
Ashtabula & Lake Shore Ry., Ashtabula, Ohio.....	0.4		
Pennsylvania & Ohio Traction Co., Ashtabula, O.....	24.0		
Norwalk & Shelby R.R., Norwalk, Ohio.....	24.0	125,000	150,000
Ohio River Electric Railway & Power Co., Pom- eroy, Ohio.....	12.70	300,000	315,000
Pacific Power & Light Co., Portland, Ore.....	5.6		
Berwick & Nescopeck Railway, Berwick, Pa.....	1.66		
Corry & Columbus Traction Co., Corry, Pa.....	4.0		
Titusville Traction Co., Titusville, Pa.....	16.71		
Montoursville Passenger Ry., Williamsport, Pa.....	5.5		
Cheyenne Electric Ry., Cheyenne, Wyo.....	5.5		
Total for 1924 (23 companies).....	225.52	1,820,000	3,560,000

& Fox River Electric Company, while the third rail interurban was reorganized as the Chicago, Aurora & Elgin Railroad. Both of these are solvent, but due to claims remaining against the original company, the receiver of the Aurora, Elgin & Chicago has never been discharged. Since this latter company does not control any of the property it has been removed from the table.

The Northern Massachusetts Street Railway and the Connecticut Valley Street Railway of Greenfield, Mass., were abandoned in 1923 and sold for junk. Subsequently portions of these properties were taken over by the municipalities of Athol, Orange, Greenfield and Montague and two municipally operated companies known as the Greenfield & Montague Street Railway and the Athol & Orange Transportation Areas were formed under the laws of Massachusetts.

The Alamance Railway Company, Burlington, N. C., was not included in the list of receiverships in 1923, as it was thrown into receivership on Dec. 15, and information was not available until after the forms were closed for last year's Statistical Number. This company, which had 8.4 miles of track, was capitalized at \$60,000 of stocks and \$120 in bonds.

Preventing Election Day Accidents

MUNICIPAL election days in New Bedford, Mass., have been the occasion in recent years of numerous collisions between autos and street cars. These collisions for the most part have been due to the increased use of automobiles to transport voters to the polls, and the desire on the part of the drivers to make as many and as speedy trips as possible. Realizing that it would be difficult to get the automobile drivers to be more careful, the management of the Union Street Railway undertook to warn its motormen to be particularly careful on that day. On election morning two large posters were placed in conspicuous places in the carhouse, where all trainmen could see them. These signs read: "Watch the cross streets—Today is election day and autos are sailing through the streets. Let's have one election day without an accident." A sticker reading "Watch the cross streets" was pasted on the inside front vestibule window of each car, and served as a reminder to the motorman throughout the day. As a result of this simple campaign the number of accidents was reduced from eight, the average for previous years, to two, both of which were of minor importance.

Less Accidents Without Fenders in Baltimore*

ALL projecting fenders were removed from street cars of the United Railways & Electric Company of Baltimore, Md., with the approval of the Public Service Commission. Formerly fenders of the projecting type were carried on all cars, and H-B lifeguards were also installed as additional protection. A careful record has been kept, and since the removal of the projecting fenders it is the company's experience that many accidents have been avoided that formerly were caused by these fenders projecting beyond the ends of the cars, particularly at curbs and locations along the track where there are narrow curves.

The reduction in accidents since the fenders were

REDUCTION OF ACCIDENTS TO PEDESTRIANS IN WHICH FRONT END OF STREET CAR WAS CONCERNED, BALTIMORE, MD.

	With Fenders	After Removing Fenders				
Years beginning May 10.....	1919	1920	1921	1922	1923	
Picked up by fender.....	179	....	....	....	....
Picked up by wheelguard....	....	49	31	39	33
Rollled off of fender.....	2	....	....	....	....
Went under car, not picked up by wheelguard.....	18	13	12	21	26	
Struck and brushed aside....	191	141	113	120	123	
Struck but not knocked down	41	14	22	12	24	
Total	431	217	178	192	206	
Decrease, per cent.....	....	50	59	55	52

removed May 9, 1920, is indicated in the accompanying table. While there have been minor fluctuations in the number of accidents to pedestrians from year to year, there has been a reduction of approximately one-half ever since the fenders were removed.

It is stated that it is impossible to estimate the amount of saving due to the elimination of fenders, as the awards or verdicts in accident cases vary, but the annual saving in maintenance is estimated at \$13,500.

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

The News of the Industry

Referendum Ready

Chicago Voters Will Answer Questions on Purchase of Railway Properties and Municipal Ownership

While stinging charges flew in Chicago over the traction situation created by the municipal ownership campaign, city lawyers have proceeded to work out the legal features of a referendum on the purchase and operation of transportation lines. The ballot or ballots will be presented to the voters on Feb. 24. One of the propositions is so phrased that the vote will give a direct answer to the controversial question between utility operators and public men of whether or not public ownership is discounted in the eyes of the people of the city.

TWO PROPOSITIONS SUBMITTED

"Shall the city issue \$1,000,000,000 in special bonds (Schwartz certificates) for the purpose of purchasing the _____ Lines?" will be the first question. In the blank it is likely that only the name of the Chicago Surface Lines will be inserted. Inasmuch as differences of opinion exist between Mayor Dever and Samuel Insull, head of the elevated lines, it is likely that the Mayor will have to drop that much of his program and admit defeat for his consolidation schemes, for no progress has been made toward getting a figure on the price of the elevated. On the other hand, engineers are fast rounding up the work of the evaluation of the Chicago Surface Lines.

The second proposition will be brief. It simply asks the voter whether he approves of municipal operation. To carry, it must have a majority of the highest number of voters voting at the election, and if it fails the first proposition will be nullified regardless of what majority it might have. It is necessary from a legal standpoint to submit the proposals despite the fact that the city would not have actual control of the operation of the property for years.

Henry A. Blair, head of the Surface Lines, although not ostensibly campaigning, has taken several stinging shots at municipal ownership recently. Mr. Blair, seeking to help the transportation situation, had offered a plan for consolidation of elevated and surface lines, taking the city in as a partner and eventually giving it the consolidated plant by credits taken from earnings.

MAYOR'S ATTITUDE CRITICISED

Mayor Dever is bitterly assailed by the Northwest Side Commercial Association over his recent debate with Samuel Insull. In a pamphlet issued Jan. 1, and which is entitled "The Truth About the 'L' Roads," the club's secretary says Mayor Dever signed his

subway-municipal ownership message to Council in October without comprehending its meaning and that he has no facts to support his contention that Insull cannot raise \$25,000,000 to finance the new elevated lines for which

he is seeking franchises in the city. The author of the pamphlet, T. F. Deuther, previously had been a sharp critic of transportation lines, which he assailed as controlled by "the traction barons."

One-Man Car Case Argued

Officers of Prominent Roads in East Testify Before the Members of the Public Service Commission Sitting in Buffalo Regarding Their Experiences with One-Man Cars

REPRESENTATIVES of electric railway systems throughout the East have rallied to the support of the International Railway in its efforts to continue the operation of one-man cars on the local lines of the system in Buffalo. During the week ended Jan. 3 the Public Service Commission held a hearing in Buffalo on the application of the City Council of Buffalo to have the state utilities board abolish one-man cars in the city. The evidence was heard by Commissioners William R. Pooley, Oliver C. Semple, George R. Van Namee and Charles Van Voorhis of Rochester.

STATISTICS SHOW HIGH DEATH RATE

Evidence was presented by a score of witnesses for the city, tending to show the increased number of accidents due to one-man car operation on many of the heaviest patronized lines of the city. Included in the evidence was a report issued by the United States Department of Commerce which showed Buffalo's death rate from street car accidents was the highest in the country in 1923. The list included 66 cities of 100,000 population or more and the death rate for Buffalo due to street car fatalities was 6.9 per 100,000 of population.

Among the witnesses for the International Railway were Herbert G. Tulley, president; Harry B. Weatherwax, vice-president of the United Traction Company, which operates one-man cars in Albany, Troy, Cohoes, Watervliet and other cities; Edward Dana, general manager of the Boston Elevated Railway; Clinton E. Morgan of Brooklyn, vice-president of the Brooklyn City Railroad; Edwin M. Walker, president of the Schenectady Railway, and others. Coleman Joyce, general counsel for the Mitten interests of Philadelphia and Henry W. Killeen, Buffalo, counsel for the International, appeared for the company.

President Tulley told the commission there is no reason why one-man car operation should be abolished in Buffalo. He testified that if he felt one-man cars are accident breeders, the management would discontinue them for humanitarian and economic reasons. Experience, however, he said, has shown they are safer than two-man

cars. He submitted figures dealing at length with the records of accidents in Buffalo to prove his point.

Mr. Weatherwax expressed the opinion that as far as safety, adequacy of service and economy are concerned there is no other vehicle that compares with the one-man car. He said they are the only salvation of some traction companies. Taking similar periods of operation in 1920 on his lines when two-man cars were in use and in 1924 when one-man cars were operated, Mr. Weatherwax testified that accidents were reduced from 2,241 to 1,675. He said there were fewer loading and alighting accidents, but that collisions had increased from 1,054 to 1,237. He attributed this increase to the larger number of automobiles in operation today. He also testified that collisions had increased under one-man car operation, although 1,000,000 fewer car-miles were operated.

EVIDENCE TO PROVE ONE-MAN CAR OPERATION SAFE

Edward Dana, general manager of the Boston Elevated, produced records to prove that one-man car operation is safer than the two-man system in Boston. One-third of the surface lines in Boston are operated with one-man cars, he said. In 1923 there were 10,000 accidents, of which there were 230 per 1,000,000 car-miles of one-man operation and 261 per 1,000,000 miles of two-man operation in Boston. So far in 1924 Mr. Dana said there have been 8,757 accidents, or 151 per 1,000,000 car-miles of one-man operation and 278 per 1,000,000 miles of two-man operation. Mr. Dana also testified that the saving by the use of one-man cars in Boston has been about \$1,000,000 annually.

Mr. Morgan of the Brooklyn City Railroad said that in the city of Brooklyn 24 per cent of all the cars on the surface lines are operated with one-man cars and that the company contemplates operating more one-man cars.

Mr. Walker went over the ground of his experience with one-man cars, particularly their use in Terre Haute, a complete one-man installation put in under his own direction.

As was explained briefly in the ELECTRIC RAILWAY JOURNAL for Dec. 13,

the City Council of Buffalo recently enacted two measures in its movement to prohibit the operation of one-man cars on all local lines of the International Railway. This it did despite the opinion of the city law department that the ordinances are unlawful. Within 24 hours after the ordinances were enacted motorcycle police arrested eight operators of one-man cars on a charge of speeding.

The car operators who were arrested, through counsel for the railway, entered pleas of not guilty. The basis of the action by the city against the operators who were arrested is that they were running their cars in excess of 6 m.p.h., the speed which was fixed as the limit in one of the recently enacted measures.

One-Man Cars in Worcester Not a Menace

There is no reason for curtailment of the use of one-man cars by the Worcester Consolidated Street Railway, Worcester, Mass. This is the finding made by the inspectors of the State Department of Public Utilities, who recently completed an investigation of the use of one-man cars in that city. The inspectors found that only one of the eight specific complaints against cars was justified—the complaint regarding an insufficient number of electric switches. The department dismissed the petition of the Worcester city authorities asking that one-man cars be banned.

The inspectors recommended:

Stricter supervision of the operating department of the Worcester Consolidated.

Installation of car starters in the congested districts to make change and announce the routes of approaching cars.

Installation of additional electric switches.

Improved car inspection service, especially as to destination signs.

Stricter enforcement of the rule requiring conductors to announce the streets.

An arrangement for distribution of mail and papers from cars that would do away with the need for the motorman to leave the car platform.

Extended use of hand brake.

Use of change carriers by operators of one-man cars.

Extra cars from Grove Street making initial trip from city hall to use Summer Street from city hall.

Better co-operation of patrons.

The report of the inspectors has apparently satisfied Worcester for the findings have been generally accepted as satisfactory by those agencies and groups which initiated the complaint against the use of one-man cars as a menace to the safety of patrons and a factor in the complicating of Worcester's traffic problems.

The railway officials have declared they will put all the recommendations into force as rapidly as it is physically possible to do so.

The fight against one-man cars in Worcester was brought to a head by an accident in which a woman and child were killed. The City Council took up the question, with the result that a petition was filed with the Public Utilities Department voicing official opposition to one-man cars. The department immediately assigned inspectors to make an investigation. The work took several weeks. The findings made by the inspectors have been accepted by the city government without question.

Railway Officers Testify at New York Inquiry

William S. Menden, president of the Brooklyn-Manhattan Transit Corporation, and Frank Hedley, president of the Interborough Rapid Transit Company, were the witnesses on Dec. 29 and 30 in the investigation being conducted before Judge McAvoy at the instance of Governor Smith.

The testimony of both was very much along the same lines. They told in detail the reasons for the inability of the companies to give better service. Mr. Menden said that expenditure by the city of \$30,000,000 to build the Nassau Street subway, complete the Fourteenth Street-Eastern line, provide adequate shop facilities and lengthen station platforms to take eight-car trains would double the capacity of the B.-M.T. system. Mr. Menden declared that expenditure of this sum, approximately one-fifth of what the city now has invested in the B.-M.T. subway system, would increase its capacity from 600,000,000 passengers a year to 1,200,000,000. All but the lengthening of the station platforms are contract obligations of the city, he said.

Other features of Mr. Menden's testimony included a declaration that lack of shop facilities had prevented the company from increasing its non-rush hour service and the assertion that lack of these same facilities had made it impracticable to buy new steel cars to substitute immediately for those now in use in the Center Street loop. Mr. Menden said that personally he did not think the use of the wooden cars constituted any appreciable hazard but that the company intended to displace them as soon as possible because of the public sentiment against them.

Mr. Hedley declared that the company's rolling stock was now being crowded to the maximum, consistent with safety, in an attempt to comply with the Transit Commission's order of two years ago, directing the company to run 360 additional trains. Because of the alleged failure of the city to supply adequate shop and yard facilities, Mr. Hedley testified, the company had had great difficulty in meeting the terms of the order and only during this year had been able to give practically complete compliance.

Mr. Hedley said that the inspection facilities had been improved during the last few years and that the shop facilities would be sufficient in a short time when the second and third additions of the Lenox Avenue shops, now practically completed but not formally turned over to the company, were put into use.

Asked why non-rush hour express service north of Times Square had not been increased, Mr. Hedley said:

Because we are crowding that rolling stock in the subway to the maximum, we are crowding it even beyond what it should be crowded in making a daily average car mileage, and if you increase that daily average car mileage in the middle of the day you will have cars that will have to be withdrawn from service that will not be ready for service during the rush hours, and it is my opinion that if we should increase today the mileage in the middle of the day we would not be able to do as well as we are now doing with the mileage during the peak load, morning and night. When you get the cars beyond a certain mileage every day, with the very

limited facilities, practically void of new shop facilities, your breakdowns to car equipment increase very rapidly with the increase in mileage. The average records that we have on that show that 1 per cent increase in mileage will add about 4 per cent to the increase in car failures, because the equipment is now overloaded, and the more you overload it the more you multiply your troubles.

J. S. Doyle, assistant to the general manager, testified that a great increase in number of "car failures" and in the number of cars requiring repairs resulted from the intensive use of the company's rolling stock in an effort to comply with the Transit Commission's increased service order. He said that the number of cars requiring repair increased from 23 to 33 a day. Later he said car failures became fewer, as the company obtained more inspection facilities and improvised shop facilities. He added that although the car "breakdowns" had been reduced, the delays on the line had not been reduced and said that in his opinion this was due to the overcrowded condition of operation of the subways.

Bus Regulatory Ordinance for St. Louis Protested

It would be a breach of good faith on the part of the city of St. Louis should it enact the proposed city ordinance for the rigid control of buses prepared by C. E. Smith, consulting engineer for the city, for it would put the People's Motorbus Company, now operating over 54 miles of city streets, out of business. Robert W. Burkham, counsel for the motor bus company, so informed members of the Aldermanic committee on public utilities at a public hearing on Nov. 26. Mr. Burkham also charged that the further purpose of the bill was to make it forever impossible for any other independently owned motor bus company to operate in the city. Mr. Burkham said that the terms of the ordinance were so unfair as to the regulations, operating conditions and taxation imposed that it would be impossible for the People's Motorbus Company to accept it, and he then pointed out that the ordinance provided that the grant must be accepted immediately by the present company in full should it seek to retain the permits for bus lines it now holds.

Col. Albert T. Perkins, general manager for Receiver Rolla Wells of the United Railways, stated that the first information any of the United Railways officials had of the bill's existence was when they read in the newspapers that it had been presented to the Aldermen. He informed members of the committee that he was just as firm a believer in buses as either Mr. Burkham or Mr. Meade and three years ago had endeavored without success to obtain permission from the federal court to install bus lines. However, he stated that the buses should co-ordinate with the street cars.

Mr. Smith, the author of the bill, told the committee that he advocated the measure to protect the public against possible watered stock, if not during the present management, perhaps in the future.

The committee has taken the bill under advisement.

Marching at 4 m.p.h., it would take this army about 16 years or until 1940 in pass in review.

St. Louis Hard Hit by Storm

Street car traffic in St. Louis, Mo., suffered severely in the storm on Dec. 18 and 19. Many lines were put completely out of business and cars on others were forced to operate behind schedule. On Dec. 18 toward evening at the very beginning of the peak-load period the temperature fell quickly and in a few hours the wires and tracks were covered with sleet. Poles of telegraph and telephone companies snapped and dragged their wires down over the tracks in some sections, while many large trees also fell. A strong wind added to the damage.

H. O. Butler, traffic manager of the United Railways, at 9 p.m. issued a bulletin that all traffic between Wellston and St. Charles, Mo., would be suspended. Some cars on this division were marooned. The Kirkwood-Ferguson division also suffered greatly. The Illinois Traction System, which operates out of St. Louis via the McKinley Bridge, was hard hit, as were the East St. Louis & Suburban Railway's city lines in East St. Louis and Alton, and the St. Louis, Columbia & Waterloo Railway.

For a time the only county division of the United Railways able to operate was a section of the Kirkwood-Ferguson line between Wellston and Brentwood. In all 60 cars were stranded on the county lines.

Superintendent Butler of the United Railways pronounced the storm the worst in 36 years. While the company succeeded in keeping most of the city lines in service between terminals there was considerable congestion.

The first sleeper out of St. Louis over the Illinois Traction System after the storm for points east and north did not leave until the night of Dec. 22. This company, however, succeeded in maintaining service on its lines from Champaign to Danville and on several branch lines out of Danville. In Springfield, Ill., tractors were used to rescue some of the stranded cars.

At Decatur, Ill., buses operated by the Illinois Power & Light Corporation worked without interruption during the storm and saved the city from complete transportation paralysis. Chauffeurs changed the usual route slightly when obstructions were encountered, but service was fairly reliable despite unprecedented difficulties. Buses are now run to every section of the city, but it was never anticipated that practically the entire load from the railway would be thrown upon them.

Steam railroads were also hard hit by the storm and crack trains were from 16 to 48 hours behind schedule into St. Louis. Few long distance telephone lines remained in service.

Mayor Suggests Conference with Portland Officials

In a letter to the City Council recently, Mayor Baker of Portland, Ore., recommended that that body confer with the Portland Electric Power Company on the matter of car extensions to districts now declared to be inadequately served. The Mayor also suggested one-way traffic for street cars and rerouting where cars now interfere with the one-way traffic plan.

One of the problems to be worked out in connection with the extension of service to new districts, the Mayor suggested, was whether the extensions should be made by car line or by bus lines. He pointed out that because of the large investment of the Portland Electric Power Company it should have the first opportunity to make the extensions. If the extensions were made by operation of bus lines, Mayor Baker declared that transfers should be issued between the buses and the street cars.

He suggested a plan be worked out by which these districts might be served without duplication of that service given by the company, and argued that any duplication would be unsound.

The Portland Electric Power Company has already indicated its willingness to use the bus in one or two other instances.

Subway Fund Only for Subways

Only expenditures specifically attached to construction of the downtown subway in Pittsburgh can be made from the \$6,000,000 bond fund authorized by the people's vote. This is the substance of a ruling made by Judges James R. Macfarlane and Joseph M. Swearingen, hearing the action to restrain the city from maintaining the bureau of traffic relief from the fund. The court said:

This ordinance is rather broad. The measure provides for the creation of the bureau of traffic relief for the purpose of making a study and investigation into the feasibility, advisability, location, and cost of traffic relief by means of a subway, or otherwise, in the First and Second wards of the city of Pittsburgh and to estimate the cost thereof, and in connection therewith to study and investigate the vehicular traffic in the downtown business districts of the city and report from time to time and recommend measures of relief both of an experimental and permanent nature.

This thing might go on indefinitely and still there would be no subway.

The court made it plain that the city could use money from the bond issue which would be a legitimate expense in connection with the building of the subway, but no portion of it could be used for making an investigation into traffic problems.

Experiment with Fewer Stops in Boston

The Boston Elevated Railway recently decided to try the skip-stop plan in Beacon street for 60 days. Edward Dana, general manager, said:

The number of stopping places per mile determines to a large extent the character of the service rendered. Service is slowed down and rapid transit prevented by observing a large number of stopping places. The cost of service also is affected by the number of stopping places. If a minimum number is provided, power consumption is reduced, other economies follow and better service may be rendered. The greatest economy as well as efficiency of service can be obtained with between four and five stops to the mile.

Applying this principle to this particular line, it is estimated that a saving of \$20,000 a year can be made in the cost of service. Beginning Dec. 1 the board of trustees has decided to make a trial for 60 days of the effect of reducing stopping places to the above standard between Cleveland Circle and Kenmore Street on the Beacon Street line. During this trial it will be possible to determine whether or not the service is improved and whether it is in the interest of the greatest number to continue this arrangement and extend it to other routes of the Elevated Railway.

West Penn Railway to Seek Co-operation of Civic Bodies

A movement to attract new industries to the territory covered by the West Penn System in western Pennsylvania, Ohio, West Virginia and Maryland has been started by the West Penn System in the inauguration of an industrial extension department.

The primary object of the movement is to attract additional manufacturing plants, but a specialized effort will be made to secure those of a diversified nature. It is hoped that the plan will eliminate to a certain extent the possibilities of a partial or complete shut-down of all industries at one time.

The close proximity of raw materials, economy of fuel and power, abundance of labor, unexcelled transportation facilities by rail and water and the nearness to markets are expected to prove unusually attractive to manufacturers now located in sections of the country that do not offer these combined advantages.

E. B. Glazier, industrial extension engineer of the West Penn System, will supervise the work. He will confer with the boards of trades, chambers of commerce, other civic bodies and the local industries in the various cities and towns in an effort to have them co-operate with him and furnish statistics and information regarding the particular advantages they can offer to concerns seeking new locations for plants.

Combined Ticket and Selling Agents in Brooklyn Make Good

Two ticket agents of the Brooklyn-Manhattan Transit Corporation, Miss Kathryn Rocha and Miss Mary Begot, who have been on duty for some time past at the Newkirk Avenue station of the Brighton Beach line, are conducting a merchandising experiment in which they combine the duties of ticket agents for the B.-M. T. and sales agents for the Broadway Subway Advertising Company, which has the contract for advertising and vending on the B.-M. T. lines. The experiment is being made as the result of the installation of additional entrance and exit facilities for passengers at this station. Four automatic turnstiles have been installed in place of the two operated by agents.

The ticket agents now are on duty at the news-stand and make change there for passengers who are not supplied with the nickel needed to operate the automatic turnstiles. The agents have so arranged their hours that two of them are on duty from 6 a.m. to 10 a.m. on weekdays, and thus passengers will not have to wait for change during the period of maximum traffic. The two agents have an assistant who relieves them during the early morning hours, so that they provide 24-hour service in their dual capacity of ticket agents and sales agents. The experiment has been in effect since Nov. 29. It is understood to have worked out satisfactorily for the public, the agents and the companies. The agents receive a commission on the sales of papers, periodicals, cigars, cigarettes and candies, so that as they increase the sales their compensation increases.

Loan Association at St. Louis Unusually Successful

More than 25 per cent of the employees of the United Railways, St. Louis, Mo., have been enabled to purchase their own homes through the operations of the United Railways Savings and Loan Association.

Since the association was formed in 1915 by officials of the company 1,550 members have built or purchased their homes with the assistance of the association. More than 4,000 workers have bought stock, paying for most of it on the monthly payment plan.

The success of the plan of helping the workers to help themselves is believed to have been responsible for reducing the labor turnover to a point where it is no longer a problem to the management. Among the 4,000 ear-men now serving the company it is said that not one was hired or fired during a recent period of four months.

Robert Richardson, president of the association, is quoted as follows:

The satisfied employee is the one who is saving money, and the United Railways encourages every man and woman in its employ to become a saver. I find that more than one-half of our workers today own their homes, a record which far outdistances any other body of industrial workers in St. Louis.

The United Railways Savings and Loan Association, organized under the building and loan laws of Missouri, operates along the lines of a savings bank. No penalty is assessed for failure to pay dues promptly. Interest starts from the time the money is deposited and an employee needing his funds for an emergency may obtain them at any time without loss. For instance, of the worker agrees to purchase \$4,000 of stock of the association at the rate of \$20 a month an insurance feature provides that if he dies the beneficiary shall get the \$4,000 stock paid in full.

The Employees' Mutual Benefit Association also furnishes the workers for the street railway company free medical attention for themselves and members of their families. The dues in this organization are only \$3 a year.

In 1923 more than 50,000 cases of sickness were handled by the association. Hospital fees are also provided, while the family is cared for if the breadwinner is not able to work.

Riders Receive Transit Story at First Hand

Passengers on the Brighton Beach, Sea Beach, West End, Fourth Avenue and Culver lines of the Brooklyn-Manhattan Transit Corporation have received copies of a booklet entitled "Rush-Hour Relief for Passengers on Brighton Beach and Other South Brooklyn Lines." This distribution was made on Nov. 28. A similar booklet will be distributed on the Eastern District lines. The facts of the transit situation which apply particularly to this section of Brooklyn are set forth in the booklet. These facts are supplemented by a copy of the letter written by Gerhard M. Dahl, chairman of the B.-M. T., on Nov. 10 to Mayor Hylan, in which Mr. Dahl used the Mayor's statement in defense of the 1925 city budget to refute the

Mayor's assertion that the transit companies in New York City can and do make plenty of money on a 5-cent fare. The distribution of this booklet to passengers is part of the B.-M.T. program of presenting the facts of the transit problem to the public.

Negotiations Over Buses Still Under Way in Kansas City

Negotiations are still in progress between the receivers of the Kansas City Railways and the city concerning regulations affecting bus transportation. The federal court is awaiting the outcome of these proceedings before issuing a final order regarding the installation of bus service by the railway. Tentative suggestions from the city officials indicate that a 3-year franchise for bus operation may be offered to the railway. A 5-year franchise was the minimum suggested by representatives of the railway.

Meanwhile a special commission on bus service, appointed by the Mayor several months ago, has made a preliminary report. The commission recommends that any bus line operating should have a permit that designates routes and stops; that interurban buses shall not enter the congested district, and that parking should be prohibited on downtown streets over which buses operate, to give them a clear way.

Binghamton Railway Tells Binghamton

In connection with the twentieth anniversary of the Binghamton Press, the Binghamton Railway, Binghamton, N. Y., recently ran a full page ad in the paper emphasizing the fact that a community grows no faster than its public utilities. Along with some facts about its passenger-carrying capacity and its average speed, the ad contains pictures showing the company's progress in equipment since 1886. In contrast to the 1886 model, the picture shows the railway's 1924 steel car seating forty-two passengers, the standard car adopted for present-day service.

Public Official Wants Mental Test for Every St. Louis Autoist

Major Clinton H. Fisk, director of streets and sewers, St. Louis, Mo., at a recent meeting of the St. Louis Traffic Council urged that an ordinance be passed to force every motor vehicle driver of the city to submit to a mental test in order to obtain a license to drive. At a round-table discussion of traffic problems in which officials of the United Railways, the People's Motorbus Company, taxicab and truck operators and police department officials participated, Major Fisk was assured that each of the interests represented would support a bill of this character.

Major Fisk pointed out in his talk that at present taxicab and motorbus drivers are compelled to submit to a mental test to obtain licenses, and expressed the belief that there is no valid

excuse why all drivers should not be compelled to do so. He stated that a bill of that nature will be submitted to the Board of Aldermen when that body reconvenes in October.

A report read at the meeting showed that there has been an increase of 22 per cent in the number of motor vehicle accidents during the past few months despite a decrease in all other accidents.

Col. Roy Britton, president of the Automobile Club of Missouri, an organization with more than 21,000 members in St. Louis alone, is opposed to Major Fisk's plans.

Salesmen Must Not "Pass Up" Patrons

Trainmen of the Pittsburgh Railways, Pittsburgh, Pa., have been warned against the common fault of motormen in sometimes neglecting to stop for waiting patrons. The company feels it is not part of the sales philosophy to neglect a possible patron and it has brought to the consideration of all employees the duty of selling rides. The company says:

Stop and consider the fact, and it is a fact, that you are salesmen. You are engaged in selling a useful commodity—transportation. A salesman of little ability can sell what the customer must have, but it takes real ability to sell the customer something about which he is indifferent, or of the value of which he is ignorant.

Many of our patrons are not compelled to patronize our cars. They have the choice of other methods of transportation. It is our job to make transportation via the street car as safe, pleasant and speedy as possible, and so attract the greatest number of patrons. Just now we have the added incentive of a falling off in traffic, due to business depression, to spur us to increased effort to secure more riders.

These things being true, what is to be thought of the trainman who deliberately turns aside (perhaps permanently) proffered business by failing to stop his car upon signal of persons desiring to ride? We know that men who do this would not long be retained by commercial houses if guilty of such action—or rather inaction—there.

You are salesmen! It is your duty to sell rides. When you perform this duty you will not "pass up" any person waiting to board your car. Indeed, the person not directly at the stop, but approaching it in evident haste, should be accommodated when this is practical.

Be a salesman—and a live one.

Railway Wins Track Suit

The Boston & Worcester Street Railway will not have to pay Southboro, Mass., the sum of \$900 a year for 1920 and 1921 in consideration of track locations in the town, according to a recent ruling by the Supreme Judicial Court in the \$1,800 suit brought by the town against the company. The Supreme Court upheld the decision of Judge Alonzo P. Weed, who found for the defendant in the Superior Court on Feb. 11, 1924. It was alleged the railway refused to pay the amount due for 1920 and 1921. The defendant claimed that the agreement was illegal and void as it was in violation of the statutes of the commonwealth. Judge Weed found that the tracks of the company in Southboro were mostly over a private way. He also found that the defendant had paid more than \$900 per annum in excise tax previous to 1920, the amount levied by the town. These excise taxes were not due in 1920 and 1921 according to the statutes, the court ruled.

Traction Company Entertains Community at Christmas

More than 4,000 people attended the fourteenth annual Christmas tree celebration conducted by the employees of the Beaver Valley Traction Company, New Brighton, Pa., on Dec. 22.

A tree, claimed to be the largest ever erected in the community, was placed in the center of an enlarged dancing pavilion in Junction Park, owned by the company. The doors were opened at 6 p.m., and from then until 2 a.m. a stream of men, women and children kept coming and going.

Children from the various institutions were guests of the employees. In addition town and borough representatives, members of the various civic and social clubs and chambers of commerce in the valley were invited.

The tree was illuminated with colored lights and a large star, formed of shaded lights, was perched in the extreme top. These were in addition to the usual decorations. Artistic effects were produced by the lighting and by pine covered with cotton so placed that the hall gave the appearance of a pine forest snow-bedecked.

Santa Claus made his entrance promptly at 8:30 in a sleigh drawn by six little folks. He was joyously greeted by the children and as his sleigh moved about the pavilion the merry crowd stormed him, insisting that he open his packs of gifts forthwith.

With Santa's help the children were formed in lines of twos and after marching once around the pavilion they were taken to the basement, where lunch was served and gifts distributed. Motion pictures were then shown in the addition to the pavilion, where the latest in funny reels was used to hold the attention of the children while the pavilion proper was being used for the festivities arranged for the adults.

C. D. Smith, general manager; Grover C. Wolfe, Mrs. C. D. Smith and Miss Elma Graham received the guests.

Winnipeg Company Likely to Expand

Further extension of the Winnipeg Street Railway, Winnipeg, Man., through adjacent municipalities is one of the projects likely to be undertaken during the administration of George W. Allen, who succeeds Sir Augustus Ganton as president of the Manitoba Power Company and the railway. Reports that the railway will voluntarily be surrendered to the city upon expiration of its franchise are declared to be unofficial. The railway has been urging a 10-year renewal and is still anxious to secure a new lease. If the city does not give notice of intention to exercise its option, the franchise will be extended automatically 5 years.

Names Day for Hearing.—The Ohio Public Utilities Commission has set Feb. 5 as the date for a public hearing on the petition of J. Harvey McClure, receiver, for the abandonment of the Dayton-Union City division of the Indiana, Columbus & Eastern Traction Company. The branch line sought to be abandoned is 55 miles long.

Special Service Announced.—The Milwaukee Electric Railway & Light Company recently introduced a "business men's limited" between Milwaukee and Oconomowoc. The response was so popular that the company has announced similar special service between Watertown and Milwaukee.

Questions Eight-Cent Fare Right.—Since Federal Judge Lewis decided that the Denver Tramway, Denver, Col., has a perpetual franchise to operate its cars on the streets of Denver, basing his decision on the agreement signed by the city and the company during 1885, 1888 and 1906, the city has stated that if such be true, then those signed agreements call for a 5-cent fare and that it will insist upon this charge. Taking this stand the city will not enter into any discussion as to the valuation. Henry E. May, the present city attorney, has presented the case before Mayor Stapleton with the purpose in view of having the Supreme Court of the United States pass upon that part of the ruling by Judge Lewis in which he says that the tramway has a perpetual franchise.

Appeals From One-Man Car Ruling.—Besides being granted an injunction which authorized the present status of one-man car operation in New Haven until Jan. 6 the Connecticut Company has filed an appeal with the Public Utilities Commission from the provisions of the prohibitory ordinance. The new ruling forbids the operation on certain streets between 6 a.m. and 10 p.m. of street cars without a conductor in addition to the operator. The appeal states that the ordinance is unreasonable and null and void and that it is discriminatory because it permits the operation of one-man cars by the New Haven & Shore Line Railway in New Haven.

Merchants Make Traffic Suggestions.—As a substitute for the short looping plan advanced recently by the Pittsburgh Railways, Pittsburgh, Pa., the Downtown Business Men's Association at a hearing before the transit conference board suggested through car routing and no parking in the central business section. Establishment of one-way streets was also proposed.

Agreement Reduces Fares.—Further consolidation of fares has been accomplished by the Chicago City Railway through the operation of an agreement with the Chicago & Joliet Electric Railway, which reduces 10 cents a day the round trip fare of passengers from southwest suburbs working or shopping in Chicago. Formerly the fare was 10 cents to the city limits and then 7 cents. The new rate is 12 cents for the combined ride, of which 7 cents goes to the Joliet and 5 cents to the city company. As evidence of payment of the consolidated fare an exchange ticket is issued equivalent to a transfer.

Hearings on Ordinance to Be Announced.—The City Council of Cincinnati, Ohio, has emphasized the differences existing between itself and Mayor George P. Carrel on the Cincinnati traction situation by permitting a proposed railway ordinance to be introduced and by adopting a resolution to relieve the special street railroad committee appointed in February, 1924,

from further duties. The new ordinance was introduced by Councilman William Hess, who moved that it be referred to the street railroad committee of Council for public hearings. This motion was passed unanimously on an oral vote.

Quits Bus Service to University.—The Tulsa Street Railway, Tulsa, Okla., has found it necessary to curtail its bus service by discontinuing through bus service between the business district and the Tulsa University. The reason assigned is that the cost of operation of buses was 25 cents per mile while the receipts averaged but 10 cents a mile, causing a financial loss of more than \$2,500 a month. This company attempted several months ago to secure financial relief from the Corporation Commission by a fare increase, but was refused. In establishing the property valuation as the basis for rates the commission held that the bus equipment of the company could not be taken into consideration.

Grade Crossing Plans in Preparation.—The Board of Public Works of Louisville, Ky., expects to submit plans to the railroads and Louisville Railway about Feb. 1 regarding the city-wide grade crossing elimination plan in Louisville, for which a bond issue of \$5,000,000 was passed by the voters last November, and on which work is to start this year. It is planned to start with the grade crossings at Fourth and G Streets, where the Fourth Street car line crosses both the Louisville & Nashville and the Southern Railroads. It is planned to complete the elimination at this one point by 1926.

Voters Favor Trolleys.—The voters of Oxford, Mass., have gone on record as favoring trolleys over buses as a means of conveyance to Worcester, the nearest big city. The sentiment of the voters was expressed at a largely attended town meeting to act on an article which if favored would have compelled the Selectmen to issue bus permits to have conveyances run in opposition to the trolleys.

Increased Number of Witnesses.—By a consistent campaign among trainmen the Los Angeles Railway, Los Angeles, Cal., has raised the average number of witnesses per accident from less than four to approximately five during eleven months. The average number of witnesses per accident, procured by trainmen, has been compiled by the claim department and published monthly in "Two Bells," the company paper. Last November four of the five carhouses turned in an average of more than five witnesses per accident. This made the average for the system 4.92. The efforts of trainmen in procuring witnesses have been watched closely by the division superintendents.

Camden Approves P. R. T. Bridge Plan.—The plan of the Philadelphia Rapid Transit Company for operation of cars over the Delaware River bridge, submitted several weeks ago to the Joint Commission, has been approved by the City Commission of Camden at a special meeting. The Camden Commissioners reserved the right to designate the streets to be occupied by the tracks and this phase of the proposal will be considered later.

Increased Fare Allowed.—The Crown Hill line, operating from a junction on the West Twenty-ninth Avenue line of the Denver Tramway, Denver, Col., and running to Crown Hill Cemetery, about three-quarters of a mile, has been granted permission by the State Public Utilities Commission to raise its fare from 5 cents to 8 cents. Tickets will be sold at two for 15 cents. The increase was granted because the line was operated at a loss. It is owned by the Denver Tramway.

Prepares for Bus Service in Suburbs.—The Kansas City Railways, through the receivers, is preparing to install bus service on two routes in Argentine, a suburb of Kansas City, Kan. The City Commissioners have granted a permit for the operation of these two bus lines. Transfers will be issued good on the street car lines on payment of 3 cents additional. The service is needed in Argentine because passengers have to walk over a bridge from one street car line to another. Six Mack street-car type buses are to be provided for the two routes in Argentine.

Railroads Must Protect Crossings.—Steam lines must protect railroad crossings and the street cars must stop at such crossings before proceeding, according to a ruling made by the Ohio Public Utilities Commission which has been received by P. E. O'Brien, general manager of the Springfield Railway, Springfield, Ohio. Copies of the ruling have also been received at the offices of the "Big Four" and Pennsylvania Railroads. The Springfield Railway asked for a ruling on the question as to whether or not the steam lines should protect the crossings, especially after the one-man cars are put in operation on the Springfield system. It has been the practice of the street railway conductors heretofore to "flag" the street cars at the crossings. Under the ruling the railroads will have to provide watchmen at the crossings.

Want Railway Service.—A demand for restoration of car service in Faulkner, near Boston, was voiced at a recent mass meeting in Malden. Louis Hammer, chairman of a protest committee, declared that great inconvenience had been caused the residents of Faulkner by an extra change from buses to cars due to the indirect traveling to Everett station. The lines to Faulkner were operated by the Boston Elevated Railway. The "L" substituted buses for the trolley lines. Patrons using the line now take the buses to Malden and there transfer to trolleys to reach the Everett terminal of the Elevated.

Want City-Owned Bus Line.—Citizens of the Rainier Valley who are protesting against the proposal of the Seattle & Rainier Valley Railway, Seattle, Wash., to establish a bus line on Rainier Avenue have made a counter proposal urging the city itself to establish a bus line from Thirteenth Avenue and Jackson Street to Henderson Street. At a public hearing it developed that the residents of the Rainier Valley district favor the bus line to supplement the railway, but oppose its establishment and operation by the Seattle & Rainier Valley Railway. Several

months ago an ordinance was introduced in Council providing \$18,000 for a city-owned bus line on Rainier Avenue, but D. W. Henderson, superintendent of street railways, declared the line could not be operated at a profit. Because of this and other opposition, the ordinance failed of passage. Some of the charges made against the railway are that the company refuses to sell school children's tickets for the same price that is charged by the city-owned lines and that the company is in default on its tax payments. The railway says that if the city established a bus line, as proposed, it would be in competition with the company on certain streets.

Company Must Furnish Reports.—As a result of an application for an increase in rates made by the Madison Railways, Madison, to the Wisconsin Railroad Commission, the company was required to furnish to that body monthly reports on the excess earnings, together with statements of the receipts and disbursements of this fund, and of the moneys realized from new capital. In its application, referred to in the *ELECTRIC RAILWAY JOURNAL*, issue of Dec. 20, the company asked for an average minimum fare of 7 cents. This would mean a cash fare of 8 cents and sale of 17 tickets for \$1. The present cash fare is 6 cents and nine tickets are sold for 50 cents. The average fare is 5.8 cents. Testimony of the company's officials divulged that the proposed improvement program would cost approximately \$700,000. Spread over a period of seven years, the company must raise \$80,000 a year additional funds in order to comply with the program.

Seek City Survey.—The Georgia Bus Association, Atlanta, has raised \$2,000 for a survey of traffic conditions to be made by a traffic expert. The Beeler report, referred to in the *ELECTRIC RAILWAY JOURNAL*, issue of Dec. 27, urged the elimination of jitneys. Jitney operators say the survey is "a brazen attempt to mislead the public concerning the real traffic situation in Atlanta."

Honors Chief at Elmira.—Employees of the Elmira Water, Light & Railroad Company, Elmira, N. Y., have a beautiful program printed on fine paper and tied with red ribbon as a reminder of a Christmas party given at Rorick's Glen on Dec. 22 in honor of Frederick Hamilton Hill, their vice-president and general manager. Mr. Hill has a more substantial reminder of the event in the form of a thoroughbred saddle horse as a token of the high regard in which he is held by his employees. About 600 people, including employees and their families, were present. A feature of the evening was the presentation of two moving pictures, "The Night Before Christmas" and "The Knight Before Christmas."

Railway Man Heads Traffic Club.—S. Russell Bowen, vice-president of the Washington Railway & Electric Company, Washington, D. C., has been chosen president of the Washington Traffic Club for the ensuing year. Mr. Bowen is counsel for the utility as well as vice-president.

Automatic Signals Will Be Used.—The Board of Public Safety, Louisville, Ky., has been empowered to go ahead with the installation of automatic or electric signal systems at street intersections without further authority from the City Council. The automatic signals, it is said, have worked better than traffic officers. They will be used at all of the congested intersections.

Makes Uniform Useful.—The Los Angeles Railway, Los Angeles, Cal., is endeavoring to increase the utility of the official uniform by making it suitable for civilian use without the conspicuous features of the official garb. Some time ago the use of brass buttons was discarded and the company insignia was transferred from the buttons to a neatly designed enamel coat lapel badge in blue and silver. The use of the badge is required only while the man is on duty. The second step to make the uniform more suitable for civilian use has been made by concealing the leather support for the pockets, without reducing the strength of the coat and trousers to any degree. The uniform is made of a good quality of blue serge.

Association Pays Claims.—The Traction and Power Mutual Aid Association, which is composed of employees of the Utah Light & Traction Company, the Utah Power & Light Company and the Phoenix Utility Company, held its annual meeting at Salt Lake City Dec. 16 and elected officers for the ensuing year. During the year 1924 the society paid death claims amounting to \$2,300, and paid \$2,932 sickness, accident and refund accounts to members, carrying \$500 reserve and death fund for the year 1925. A surplus amounting to \$8,359 was divided among the members in the form of Christmas dividends of \$9.20 for each 12 months' membership.

Bill Seeks Remedy Report.—A bill calling upon the Department of Public Utilities in Massachusetts to report on the merits of several suggestions that have been made in regard to the conduct of the Boston Elevated Railway, Boston, has been filed in the Legislature by Arthur F. Blanchard of Cambridge and Van Ness Bates of Brookline. The Department of Public Utilities is asked to study the merits of a Metropolitan Transit Commission, the change from private to customer ownership, joint ownership by the public, assessments upon real estate to cover improvement charges, and of having the directors of the Boston Chamber of Commerce appoint public trustees.

Electricity in Harbor Activities.—Two electric engines for use in harbor shunting and hauling activities were brought to Montreal recently and are now being assembled in local workshops. They are the product of the English General Electric Company and are the first of several which will replace the steam engines used hitherto. With the complete electrification of the Harbor railway system of more than 20 miles in full operation in the spring of 1925, Montreal, it is said, will not only be the quickest loading and unloading port in the world, owing to the shortness of the local season, but will also be the cleanest.

Financial and Corporate

G. E. Relinquishes Utility Holdings

New Company Will Take Over General Electric Interests and Distribute Shares to G. E. Holders

The General Electric Company announced on Dec. 30 that it will dispose of its holdings in the Electric Bond & Share Company by organizing a new corporation with an authorized capital of 1,802,870 shares of no par value stock and by transferring to the new corporation 300 shares of 6 per cent cumulative preferred stock of the Electric Bond & Share Company. This stock has par value of \$30,000. The General Electric Company will also transfer 250,000 shares of common stock of the Electric Bond & Share Company, being the entire common stock, having par value of \$25,000,000, and now paying 8 per cent dividends.

In consideration of the transfer the new corporation will distribute its shares to stockholders of record of the General Electric Company as of Jan. 15, 1925, ratably in the proportion to their holdings; that is to say, one share of stock of the new corporation to each General Electric share.

The distribution will be made on Feb. 1, 1925, or as soon thereafter as possible, when certificates for shares of the new corporation will be mailed to all General Electric stockholders.

Dividends on the new stock will accrue after Jan. 1 and will be paid quarterly by the new corporation on the 15th day of April, July, October and January.

The present dividend rate on the Electric Bond & Share stock will justify the new corporation in paying dividends of not less than \$1 a share annually.

The General Electric Company owns all the common stock of the Electric Bond & Share Company, which in itself is a holding company. Among the companies owned by the Electric Bond & Share Company either directly or indirectly are the American & Foreign Power Company and its subsidiaries, the American Gas & Electric Company and subsidiaries, the New Orleans Public Service, the Dallas Railway, the Memphis Street Railway, the Birmingham Electric Company and the Utah Light & Traction Company.

The assets of the Electric Bond & Share Company as of Dec. 31 last year were valued at \$62,552,380. The company had a working capital of \$24,764,782. The income of the company in 1923 was \$46,546,411 gross and \$30,422,561 net. It had a surplus of \$14,522,380. A statement of the reasons for the change says in part:

At the beginning of the electrical industry in the United States, it was necessary to assist in the establishment of electrical public service enterprises, not only in respect to engineering involved in construction, but particularly in rendering aid in financing the capital requirements of such undertakings. The General Electric Company and its predecessor companies—the

Thomson-Houston Electric Company and the Edison General Electric Company—under the far-seeing and courageous leadership of C. A. Coffin, were active in this field.

In order to co-ordinate these activities and render its assistance to the industry more effective, the management of investments of this character was concentrated principally in the Electric Bond & Share Company, the common stock of which has always been owned by the General Electric Company.

The Electric Bond & Share Company, organized in February, 1905, has grown in size and effectiveness. It was an important factor in improving central station efficiency, in reducing cost of electric service to the public and interesting a larger number of investors in the advantages of securities in this field.

The conditions in the electrical industry have changed; the public now recognizes investments in electrical public service enterprises as of demonstrated safety and stability. In view of these changed conditions the principle of separating the Electric Bond & Share Company from the General Electric Company has been under consideration for a long time, and today the board of directors took action determining the method of accomplishing it.

The administration of the Electric Bond & Share Company will continue under the presidency of S. Z. Mitchell, to whose able, alert and resourceful leadership its conspicuous success and prosperity is in a great measure due.

Boston Has Its Biggest Day

Edward Dana, general manager of the Boston Elevated Railway, says that Dec. 20 was the biggest day in total receipts in the history of the company. Statistics just compiled show the railway turned the corner in November with \$115,031 excess of receipts over cost of service. Receipts from fares on Dec. 20 were \$126,558. The previous high mark was two years back with \$124,718.

Revenue passengers carried in November were 24,479,948 at a 10-cent fare, 2,131,663 at a 5-cent fare and 4,121,992 at a 6-cent fare. Last year in November 24,240,628 passengers were carried at a 10-cent fare and 8,659,323 at a 5-cent fare. The totals for November were 30,733,603 in 1924 and 32,899,951 in 1923. Whether the falling off in the total number of passengers carried in November, 1924, was due to the increase of 1 cent in the fare on some of the lines could not be ascertained. There was a loss of 2,166,348 revenue passengers last November, despite the fact that 239,320 more 10-cent fares were collected. The total number of 5-cent fares in November, 1923, was 2,405,668 more than the number carried at 5 and 6-cent fares combined for November, 1924.

Receiver for Union Traction Company of Indiana

On the application of the Westinghouse Electric & Manufacturing Company, a creditor for \$74,192, Arthur W. Brady, president of the Union Traction Company of Indiana, operating 454 miles of interurban and city electric railway in Indiana, was appointed receiver for the Union Traction Company in the Madison Circuit Court late on Dec. 31. It is alleged the traction company is in danger of insolvency.

Financial Readjustment Planned

Company at Columbus, Ohio, with Future in Mind Would Revamp Capital Structure

A refinancing plan is proposed for the Columbus Railway, Power & Light Company, Columbus, Ohio, to be submitted at the annual meeting of the stockholders on Jan. 27. Under it between \$6,000,000 and \$8,000,000 would be added to the present amount of stock.

A financial structure which will probably take care of the company for the next 20 years will be provided, according to President Charles L. Kurtz. He explained that action should be taken in order to tighten up the present structure.

Bonds of the company now outstanding amount to 58 per cent of the total of outstanding securities. If the new plan is adopted, present outstanding stock will be retired and supplanted by a new series, provided the Public Utilities Commission gives its sanction.

Funds secured from the sale of the \$6,000,000 or \$8,000,000 of stock would be used to replenish capital reserves which have been depleted by improvements completed during the past four years.

At present the company is engaged in the construction of a new power plant about 8 miles from Columbus. This is really a charge to capital.

The company now has a capital stock of \$15,145,000, consisting of 60,800 shares of common stock, 19,138 shares of prior preference preferred stock, 21,125 shares of preferred stock, series A, and 50,387 preferred, series B, of par value \$100 each.

According to the plan devised, series A preferred, of which there are 21,125 shares of a par value of \$100, drawing dividends of 6 per cent, would be redeemed with an issue of first preferred of the same par value and bearing the same dividend.

Series B, a 5 per cent issue, with a provision of an additional 1 per cent after 5 per cent has been paid on the common stock, would be retired with a new series B, carrying 6 per cent dividends. Of this issue, only enough to retire the present series B, approximately \$5,030,000, would be sought.

To take the place of the present common stock, which has a par value of \$100, and of which there are 60,800 outstanding shares, it is planned to obtain authorization of 300,000 shares of common stock, no par value, to be exchanged at the ratio of two for one.

First preferred will be used to take care of further expansion, for which an authorization of \$25,000,000 would be sought. This stock and the common stock remaining, after the present series is retired, would be used for future financing. No more first preferred can be put on the market if stockholders of more than one-fourth of the stock outstanding disapprove by vote.

In explaining the new plan to the stockholders Mr. Kurtz said:

Sufficient funds for the company's needs cannot be raised by the sale of bonds. The only alternatives then for the raising of sufficient funds for the company's needs are:

(a) The sale of debentures, the security for which would be ahead of the rights of all stockholders. These debentures would have to be refinanced from time to time and might prove very embarrassing to the company in the future.

(b) The sale of preferred and common stocks. This latter is the plan recommended to the stockholders and the one to be considered at the coming meeting.

I. C. C. Approves Key System Valuation

The Interstate Commerce Commission has approved the method of valuation submitted to it by the Key System Transit Company, Oakland, Cal., which fixes the valuation of the federal body upon its properties. The definite figure will not be known for some time, but according to President C. O. G. Miller the valuation will be considerably in excess of the par value of all securities issued, including common stock. The total of outstanding securities is in excess of \$27,500,000.

The Key System was reorganized in June, 1923, succeeding to the ownership and management of an extensive transportation system which had been in operation for many years. Six months ago, in an official statement, President Miller stated that "the present depreciated reproduction value, based upon 1918-1923 average prices of the properties comprising the system, including properties of subsidiary companies which comprise less than 11 per cent of the system's mileage, is placed at \$31,900,000, which is more than two and a half times the par value of the total bonded debt, including bonds of subsidiaries."

The company's capitalization at that time included: \$2,965,000 divisional and underlying bonds; \$1,365,810 general and refunding mortgage, 1938, series A, 6s; \$7,585,200 general and refunding mortgage 1938, series 1, 5 per cent; \$2,500,000 Key System Securities Company 6 per cent collateral trust 1933 notes; \$5,872,891 prior preferred 7 per cent cumulative stock; \$3,699,691 7 per cent preferred cumulative; \$3,262,500 common stock.

Connecticut Road to Lift Receivership

A basis for reorganization by the bondholders of the Hartford & Springfield Street Railway, Warehouse Point, Conn., is being laid in a petition to be presented to the incoming General Assembly for the chartering of the Hartford & Springfield Transportation Company.

The latter company, according to its petition, wishes "the right to acquire all or any parts of the rights, franchises and property of the Hartford & Springfield Street Railway, the Windsor Locks Traction Company and the Rockville, Broad Brook & East Windsor Street Railway, including the lines of railway now owned and operated by said companies, together with the right to operate buses in accordance with the laws of the State of Connecticut."

The company has been in receivership for several years with Harrison B. Freeman as receiver. Mr. Robinson said on Dec. 27 that the experience of the receiver seemed to indicate that the property could be operated at a profit.

Purchase Talk Revived at San Francisco

John A. McGregor, chairman of the municipal committee at San Francisco, Cal., which is considering the question of the purchase of the Market Street Railway, states that the city is ready to take up final negotiations. At a meeting which will probably be held this month the city price is expected to be made known. It is understood the city offer will be on a payment from earnings basis. Appraisal figures have been compiled with company co-operation but are being held secret.

New Financial Plan Proposed for Northern Ohio Electric

A plan of reorganization of the Northern Ohio Electric Corporation is being submitted to the stockholders providing for the formation of a new company to be called the Northern Ohio Power Company, which will issue bonds and stock and raise the necessary funds to pay the \$2,680,000 loan that matures on Feb. 1, 1925. The new company will take over the assets of the present company, consisting chiefly of practically the entire outstanding \$10,000,000 common stock of the Northern Ohio Traction & Light Company, which operates the city lines in Akron and an extensive system of interurbans.

The new company is to have the following capitalization:

\$2,800,000 (which may be increased to \$3,500,000 upon exercise of options) 10-year 7 per cent bonds due Feb. 1, 1935. To be secured by pledge of practically the entire outstanding \$10,000,000 common stock of the Northern Ohio Traction & Light Company.

430,000 shares of an authorized issue of 500,000 shares of capital stock without par or face value.

70,000 options expiring Aug. 1, 1926, each ten options calling for delivery of \$100 bond and 10 shares of capital stock upon payment of \$100.

The plan provides for the deposit of the outstanding 60,000 shares of preferred and 75,000 shares of common stock of the Northern Ohio Electric Corporation for exchange for capital stock of the new company on the basis of:

For each share of preferred stock of the Northern Ohio Electric Corporation there will be delivered two shares of the capital stock of the new company.

For each share of common stock of the Northern Ohio Electric Corporation there will be delivered four-tenths of a share of the capital stock of the new company.

The depositing stockholders are offered for subscription:

\$2,800,000 10-year 7 per cent bonds.
280,000 shares capital stock.
70,000 options.

These are to be in amounts of \$100 or multiples thereof on the following terms:

\$100 bonds.
10 shares capital stock for the sum of \$100
2½ options.

Preferred stock depositors are entitled to prior right to subscribe pro rata with secondary right to common stock depositors subject to allotment.

A 10 per cent payment must accompany all subscriptions; 15 per cent to be paid when the plan is declared operative, 25 per cent each in two, four and six months thereafter, interest at 6 per cent to be adjusted at the time of final payment.

The entire subscription has been

underwritten for a commission of 5 per cent, thus assuring the receipt of funds necessary to pay the \$2,680,000 loan due Feb. 1, 1925. Upon exercise of the 70,000 options, the new company will be provided with \$700,000 additional capital.

Interest Defaulted by Michigan Electric Railway

The Michigan Electric Railway, Jackson, Mich., was unable to pay the six months interest due Jan. 1 on its first and refunding mortgage 5 per cent bonds. The following protective committee has been appointed:

Willard V. King, chairman of the advisory board of the Irving Bank-Columbia Trust Company; Livingston E. Jones, president of the First National Bank of Philadelphia; J. Peyton Clark, engineer; George R. Cottrelle, Toronto; Marvyn Scudder of Marvyn Scudder & Company; Noah MacDowell, representing Investment Registry, Ltd., London; William F. Ingold of Pynchon & Company; W. M. Flook, New York; Sydney W. Noyce, vice-president of the New York Trust Company, and Bernard C. Cobb, vice-president of Hodenpyl, Hardy & Company, Inc.

North Shore Road Calls Securities for Redemption

Notice has been served by the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., that it is prepared to redeem all of its outstanding series "A" 10-year secured sinking fund gold notes dated June 20, 1920; all of the outstanding series "B" 15-year secured sinking fund gold notes dated June 1, 1920, all of the outstanding series "C" 3-year secured sinking fund gold notes dated June 1, 1920, and all of the outstanding 1-year 6 per cent gold notes dated June 16, 1924.

Arrangements to carry out this refunding were recently made by the company through the sale to the National City Company and Halsey, Stuart & Company, Inc., of an issue of \$7,000,000 first and refunding mortgage bonds dated Jan. 2, 1925, and due Jan. 1, 1955. As noted in the ELECTRIC RAILWAY JOURNAL for Dec. 20, 1924, page 1058, these bonds bear 6 per cent interest. They were offered to investors at 98 and interest to yield 6.15 per cent.

New Financing Proposed by Boston Elevated

The Boston Elevated Railway, Boston, Mass., has petitioned the Public Utilities Department for authority to issue \$2,141,000 of 6 per cent bonds, for a term of thirty years, to pay the short term indebtedness incurred in certain capital improvements in connection with the South Boston power plant, the Everett repair shops and the Forest Hill plant and to finance expenditures necessary to be made to permit the use of the Shawmut branch, so that it may be able to borrow money on favorable terms for the rolling stock for that branch. There is provision for this plan in the special legislation enacted last year. The Public Utilities Department has held a hearing on the petition. No opposition to the plan developed.

\$200,000 Equipment Trust Issue by New York Interurban

Another issue of equipment trust obligations is being offered. The issuing corporation is the Buffalo & Erie Railway, the successor to part of the property of the old Buffalo & Lake Erie Traction Company, sold under foreclosure some time ago. The total amount of the issue is \$200,000. The offering price of the bankers, Bown & Company, ranged from 100 and interest to 100½ and interest, to yield 4½ to 6 per cent, according to maturity. The financing has been approved by the Public Service Commission of New York. The equipment on which the certificates are a lien include 14 double-truck passenger cars, four single-truck passenger cars, and two Russell snow plows. The equipment is estimated to cost \$285,000, or more than 142 per cent of the face value of the certificates. It is explained that the 18 new cars, being built by the Cincinnati Car Company, are of the so-called "Lexington" type. The certificates mature semi-annually at the rate of \$10,000 between June 15, 1925, and Dec. 15, 1934.

Company Named to Acquire Stock.

The Associated Gas & Electric Company of New York, it is stated, plans to acquire the outstanding preferred and common stocks of the New Hampshire Electric Railways, Haverhill, Mass., one of the principal companies of which is the Massachusetts Northeastern Street Railway, operating 127 miles of line. A committee of stockholders was recently formed to arrange a sale of the preferred and common shares. An offer of \$32 a share for the preferred and \$3 for the common was referred to previously in the *ELECTRIC RAILWAY JOURNAL*.

Payment on Tax Made.—First payment on \$437,500 which the Cincinnati Traction Company, Cincinnati, Ohio, owes the city of Cincinnati as franchise tax from Oct. 1, 1923, was received by the City Auditor on Dec. 27. The check was for \$350,000. Officials of the traction company announced that another \$87,500 would be paid before Jan. 15. The voucher recited that the amount was borrowed under legal authority and would be repaid during 1925, one-twelfth monthly, with interest out of subsequent gross receipts.

Another Move Toward City Purchase.

—Final authority to purchase the equipment of the New York & North Shore Traction Company, Roslyn, L. I., for \$17,650 has been granted by the Board of Estimate of New York City to William Wirt Mills, Commissioner of Plant and Structures. Before the city can go ahead with its plans to operate the line between Flushing and Whitestone certain private rights of way must be purchased. So far no action has been taken on this matter.

Youngstown Company Doing Better.

—Figures presented recently show that the railway situation in Youngstown, Ohio, is improving since the jitneys were barred from the center of the town. The first seven days after the jitneys stopped running, street car receipts increased at the rate of \$19,000

a month. The prospect now is that December will not show a loss. For the entire year, however, the loss will be between \$200,000 and \$220,000. Last year it was \$208,000. In discussing the affairs of the Youngstown Municipal Railway the *Vindicator* in its issue of Dec. 12 said that with the jitneys abolished the expectation is that in 1925 the railway system will pay its own way. Incidentally, it has been arranged for the return of the North Avenue power house by the Municipal Railway to the Pennsylvania-Ohio Electric Company for \$600,000, this amount to be deducted from the capital valuation of the municipal lines. In addition new equipment will be installed at a cost of about \$200,000 by the Pennsylvania-Ohio Electric Company at North Avenue. The improvements will include a new substation and entirely new switching facilities.

Approves Interest Payment.—Federal Judge Faris has approved the application of Rolla Wells, receiver of the United Railways, St. Louis, Mo., to pay \$1,212,000 interest on the issue of \$30,300,000 of United Railways 4 per cent bonds. The interest dates are July 1, 1924, and Jan. 1, 1925. Judge Faris failed to act on the request of Receiver Wells to refund holders of St. Louis Transit Company bonds \$624,000 which they paid in July on the interest due on the general bonds on Jan. 1, 1924. This latter payment was opposed by Rhodes E. Cave, attorney for the holders of the general 4s.

Assessment Higher.—The board of equalization on taxes after conferences with the Louisville Railway, Louisville, Ky., reached a conclusion regarding assessment of company property. It was fixed at \$12,924,633. This is \$1,034,633 more than last year and \$934,633 more than the assessment of two years ago, which was the first under the 7-cent fare.

\$5,000,000 Stock Offered.—The United Light & Railways Company of Delaware recently offered a new issue of preferred stock, incident to acquiring control of the Continental Gas & Electric Corporation, which recently took over the Kansas City Power & Light Company and the Columbus Railway, Power & Light Company, Bonbright & Company are placing the issue, which consists of \$5,000,000 of 6½ per cent cumulative prior preferred. The United Light & Railways Company is controlled, through the ownership of all its common stock, by the United Light & Power Company, a Maryland corporation, which controls and operates a group of properties furnishing various utility services in 97 Middle West communities. The new prior preferred stock issue has a par value of \$100 a share and will be acceptable at par in payment for class A common stock of the controlling company, the United Light & Power Company at \$50 a share up to March 1, 1925; at \$55 a share thence to March 1, 1927, and at \$60 a share thereafter up to and including March 1, 1929.

Pays the City.—The Denver Tramway, Denver, Col., has paid the city of Denver \$162,323, back franchise taxes. Under a court ruling the receiver must pay this \$5,000 tax every month.

November Shows Surplus.—The report for November of the Tacoma Municipal Street Railway, Tacoma, Wash., showed a balance in favor of the city for the first time since the year 1918. The gain was \$26. Operating revenues, the report showed, were \$5,463, with operating expenses \$3,256. Claims, charges, depreciation and interest on bonds used up the remainder of the surplus. This bears out the claims made for the belt line by the traffic bureau of the Tacoma Chamber of Commerce. A careful analysis of the November business shows that of the 680 cars switched by the belt line during November, only 472 would have been switched by the municipal line under former conditions.

Part of Route Abandoned.—The Geneva, Seneca Falls & Auburn Railroad, Inc., through L. G. Hoskins, attorney, Geneva, N. Y., has filed a certificate in the office of the Secretary of State at Albany declaring a portion of its route of about a mile on Stevenson Street abandoned.

On Board of Trustees.—George P. Bullard, Newton, was recently appointed by Governor Cox to fill the vacancy on the board of trustees of the Eastern Massachusetts Street Railway, Boston, Mass., caused by the resignation of Isaac Sprague, Wellesley.

Vote to Increase Capital Stock.—At a special meeting of the stockholders of the Cumberland County Power & Light Company, Portland, Me., which operates the Portland Railroad, it was voted to increase the outstanding capital stock of the company by an issue of 6 per cent preferred stock not to exceed \$500,000 in amount. This proposed issue will go before the Public Utilities Commission for approval. It was also voted by the stockholders to authorize the directors of the company to arrange for the exchange of any such preferred stock at par for any of the \$500,000 of 4½ per cent first mortgage consolidated electric light company of Maine bonds, falling due Jan. 1, 1925, or to arrange for the sale of such stock or any portion of it which may be deemed necessary to apply toward the payment and redemption of any portion of the bond issue. The stockholders also ratified and approved of the action of the directors in causing to be offered to its common stock holders of record Nov. 22, 1924, the privilege of subscribing at the rate of one share for ten of existing holdings to non par value common stock at the price of \$75 per share.

Reading Company Changes Its Name.

—W. S. Barstow & Company, New York, announce that the name of the Reading Transit & Light Company, Reading, Pa., subsidiary of the General Gas & Electric Corporation, has been changed to the Reading Transit Company. The new company is offering, through its investment department, \$1,250,000 of first and refunding mortgage 30-year 5 per cent gold bonds, series A, due Nov. 1, 1964. It also has arranged to pay the \$400,000 first mortgage 5 per cent 30-year gold bonds of the Reading & Womelsdorf Electric Railway. The holders of these bonds have the privilege of exchanging them for the new issue of Reading Transit 6s.

Legal Notes

FEDERAL COURT—Constitutionality of Rate Statute.

It is within the power of a legislature to prescribe the form of charges by a gas company, so that a statute prohibiting a "service charge" is in itself constitutional and valid. But a law passed by the New York Legislature in 1923, relating to the price and quality of gas as furnished by gas companies in New York City (cc. 898,899) is confiscatory and therefore unconstitutional, as applied to the companies considered. [New York & Queens Gas Company vs. Prendergast 1 (2d) Federal Rep., 351, also Bronx Gas & Electric Company vs. Prendergast et al, 1 (2d) Federal Rep., 377.]

FEDERAL COURT—The Paving Clause in a Franchise is a Contract.

This case arose through a plea by abutting property owners that the railway operating in a street should be required to do the paving specified in its franchise. The court held that the ordinances of a city may be local laws or they may constitute contracts. Where a franchise is accepted by a utility it constitutes a contract. Hence, the suit in question is not one to require the defendant to perform a public duty required by law but for specific performance of a contract. [State of Washington et al. vs. Seattle & R. V. Ry. 1 (2d) Federal Rep., 605.]

GEORGIA—Duty to Passenger Occupying Dangerous Position.

A railway company has a right to prohibit passengers from occupying positions on its cars considered to be dangerous, except at their own risk, but when passengers are permitted and in some instances required to occupy such positions, the company is under the duty to exercise extraordinary care and diligence for their safety. Hence, when a passenger, standing on the steps of a car, is struck by an automobile caught in a rut close to the railway right-of-way, the company is responsible. [Bailey vs. Georgia Ry. & Power Co., 124 Southeast Rep., 907.]

KENTUCKY—Person Riding on Running Board of Automobile Not Negligent.

A person riding on the running board of a crowded closed automobile with his head in the window is not necessarily negligent in so doing, and if injured by a street car while so riding, the company is responsible. [Paducah Railway vs. Nave, 265 Southwest Rep., 289.]

MASSACHUSETTS—Improperly Registered Automobile a "Nuisance."

The owner of a touring car removed the body and put on a truck body, for temporary purposes, without changing the registration or license plate. As the result of a collision with another automobile, the changed car fell into an excavation made by a railway company. The defense of the latter was that the owner of the automobile was

a trespasser, without right upon the highway because his automobile was not legally registered. This position was upheld by the court. [Nichols vs. Holyoke Street Ry., 145 Northeast Rep., 33.]

MASSACHUSETTS—Person Slipping on Step of Station.

Where a passenger slips on some slippery substance on the step of a station, and where there is no evidence as to what the substance was or how long it had been on the step, the company cannot be considered to have been negligent. [O'Brien vs. Boston Elevated Railway, 145 Northeast Rep., 259.]

MICHIGAN—Injury to Passenger While Acting as Witness to Accident.

A passenger who witnessed an accident was injured while standing by the side of the trolley car and signing his name to a witness slip at the request of the conductor. The company was held responsible for him as a "passenger" although the conductor had not invited him to leave the car. [Moffatt vs. Grand Rapids Railway, 200 Northwest Rep., 274.]

MISSOURI—Employees Alighting in Middle of Block.

It is negligent for a motorman to open the platform door between customary stopping points and to allow a trainman to get off at such point, and when such alighting trainman stepped in front of or directly against a boy riding a bicycle and caused him to fall under the wheels of the car, the company was responsible. [Gilman et ux vs. Fleming et al, 265 Southwest Rep., 104.]

NEW JERSEY—Damages from Collision Between Truck and Street Car, Where Both Were Probably Driven Negligently.

In this case a street car and loaded truck ran into each other through what was probably negligent driving of both. A passenger on the trolley car, who was injured, sued both trolley company and truck owner, and the decision of the jury against only the trolley company was sustained. [Doherty vs. Public Service Ry. et al, 126 Atlantic Rep., 466.]

NEW JERSEY—Testimony of Physician Not Always Admissible.

Declarations by a patient as to his symptoms, made to his physician for the purpose of treatment, are admissible in evidence, but where the statements are made on the day preceding the trial for the sole purpose of enabling the physician to testify at the trial as to the plaintiff's symptoms, as described by him, the testimony is hearsay and inadmissible. [Hutchinson vs. Jersey Central Traction R. Co., 126 Atlantic Rep., 482.]

NEW JERSEY—Responsibility at Crossing Determined by Jury.

In this case the railway operated over a private right-of-way close to the

highway and passed cross streets at grades. A motorcycle rider was struck while attempting to cross in front of a car at a cross street and three juries awarded the plaintiff damages. Two of these awards were set aside, but the court allowed the third verdict to stand. Death of the plaintiff in the meantime did not abate the action. [Hutchinson vs. Jersey Central Traction R. Co., 126 Atlantic Rep., 481.]

NEW JERSEY—Riding with Intoxicated Automobile Driver. Degree of Care Required of Motorman.

The plaintiff in this case was riding as a passenger in an automobile when he was injured by a trolley car. There was a verdict for him against the railway company in a lower court, but the Supreme Court upheld two grounds for appeal. One was the defense that the plaintiff was guilty of contributory negligence because he knew that the man driving the automobile was intoxicated. In developing this defense, defendant's counsel asked a witness if the driver was under the influence of liquor, but the court sustained an objection to this question, saying the witness would have to qualify as an expert. This was held by the Supreme Court to be erroneous, as ability to recognize such condition does not require special knowledge or skill. The other ground of appeal upheld was that the court charged that the defendant was liable if the jury believed the motorman could have stopped the car before striking the automobile after seeing it. This charge was held erroneous because the test was whether, in the exercise of reasonable care, he ought to have stopped it and could have stopped it. [Searles vs. Public Service Railway, 126 Atlantic Rep., 465.]

TENNESSEE—Paving Ordinance Valid for Track in Easement.

Where a deed conveyed a strip of land to a county for use as a public road or street, but subject to a 20-ft. "easement" to a street railway company for its tracks, it was held that the title to the ground included in the easement vested in the county. Consequently, after a city was incorporated, it had the power to require the company to pave between and alongside its tracks. [City of Memphis vs. Elgin, 299 Federal Rep., 564.]

TEXAS—Necessary Protection at Highway Crossing on Interurban Railway.

In the absence of statutory requirements, an interurban electric railway need not maintain a watchman, electric bell or gate at a crossing, unless it is unusually dangerous. The operation of an electric car over an unobstructed highway crossing in the country at 60 m.p.h. does not constitute negligence. If the consent of the county authorities is required before such a track can be built across a public road, the failure of the company to obtain such consent cannot be regarded as the approximate cause of a collision with a motor vehicle at the crossing, as trespass on the highway would constitute a nuisance, of which only the public could complain. [Smith vs. Galveston-Houston Electric Railway, 265 Southwest Rep., 267.]

Personal Items

Duties Realigned

Louisville Officials Promoted by Board of Directors—Title of General Manager Conferred on F. H. Miller

Frank H. Miller, vice-president in charge of engineering and maintenance of the Louisville Railway, Louisville, Ky., was made vice-president and general manager of the company Jan. 1. Samuel Riddle continues as vice-president in charge of transportation of the Louisville Railway. R. H. Wyatt, general superintendent of the Louisville & Interurban Railway, a subsidiary of the Louisville Railway, has been named acting manager of that company. These changes, announced recently by President James P. Barnes, were made merely to simplify operation of the company. The title of general manager is a new one. Both Mr. Miller and Mr. Wyatt will have authority over operating and maintenance departments.

NEW EXECUTIVES MEN OF WIDE EXPERIENCE

Mr. Miller, the first official of the company with the title of general manager, has been with the Louisville property since the fall of 1895. He started in the car repair shops and occupied the positions successively of timekeeper, storeroom man, car tester, truck repair man, assistant superintendent of the power station and then superintendent of power. When James P. Barnes became the president of the Louisville Railway in 1920 Messrs. Miller and Riddle assumed the duties of vice-presidents. It was said in the JOURNAL at that time that three practical operators of proved ability as traction executives had been chosen to manage the electric railway system at Louisville.

It was in 1910 that Mr. Riddle, who continues as vice-president in charge of transportation, became associated with the Louisville Railway as superintendent of transportation. In preparation for this post he had many and broad experiences, first becoming identified with a prominent consulting mechanical engineer and then carrying his theoretical training into practical channels in the services of the United Gas Improvement Company. In 1903 he was in charge of the erection of buildings and installation of equipment for the Connecticut Railway & Light Company. Later he was connected with the Rhode Island Company, the Chicago, South Bend & Northern Indiana Railway and then with the Philadelphia Rapid Transit Company. It was from Philadelphia that he went to the Louisville Railway.

R. H. Wyatt, new acting manager of the Louisville & Interurban Railway, was promoted to the newly created position of general superintendent of the interurban system in 1921. Prior to that and since 1910 he had been general freight and passenger agent. Mr. Wyatt is one of the veterans of the

local system. He has served more than 40 years with the Louisville company. The Louisville Railway embraces 188 miles of city track and 102 miles of interurban line.

Charles H. Allen Goes to Chicago as Comptroller

Charles H. Allen appointed comptroller Chicago Surface Lines, as referred to in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 27, 1924, has been connected with the auditing department of Stone & Webster, Inc., since 1906. At first he occupied his time with mere routine duties in connection with concerns that Stone & Webster manage or control, but in later years he handled vast amounts of confidential work of appraisals, valuation for rate-making purposes, bank reports, consolidations and reorganiza-



Charles H. Allen

tions. This character of work has kept him in contact with great projects of transportation, public utilities and industries all over the country, and it may not be far afield to say that the value of properties which he has studied and investigated as the financial representative of Stone & Webster in the last few years aggregate \$2,000,000,000.

During the World War Mr. Allen was stationed at Hog Island for eighteen months. There he served on the staff of A. R. Patterson, who was vice-president and treasurer, and in 1921 he was associated with Mr. Patterson again in a financial study of the affairs of the Commonwealth of Massachusetts under the direction of a commission appointed by Governor Cox. E. S. Webster served as chairman of that commission. This work for the state led to the creation of the present Commission on Administration and Finance.

Prior to his connection with Stone & Webster, Inc., Mr. Allen was traveling auditor for companies which operated railways, gas and electric light and power companies in southern New England. Some of these concerns were

later absorbed by the New York, New Haven & Hartford Railroad. He began his career as an auditor in Connecticut.

Journal Staff Changes

Henry W. Blake, who has been with ELECTRIC RAILWAY JOURNAL since 1891, will more completely retire from active responsibility in the production of the paper effective Jan. 1. This is following out the wish he has held for several years back. Morris Buck is promoted from associate editor to managing editor and J. A. Miller, Jr., from assistant editor to associate editor.

Mr. Blake has wanted to be relieved of the active administration of the editorial work, so that he might devote more time to his personal activities and to phases of editorial work in which he has particular interest. During the past few years he has continued as co-editor of the paper, leaving the executive responsibility largely to his associate. Now he will carry out his desire further by retiring as editor. But the JOURNAL is, indeed, fortunate in that it will continue to have the benefit of Mr. Blake's long experience in the industry as he will give some of his time to the active staff work.

As an editor Mr. Blake has for many years been pre-eminent in the field of technical journalism. He has been with the paper almost from its beginning, and with James H. McGraw has been in large measure responsible for the position it holds in the industry. In fact, as one of his long-time associates put it: "Mr. Blake has written his very life into the columns of the ELECTRIC RAILWAY JOURNAL, which stands as a monument to his 30 years' endeavor." In his career as editor he has stood out for the charm of his personality, for his extensive knowledge of the field and for his willingness to impart to others his information on the subjects connected with the transportation industry.

A graduate of Yale in 1886 as a civil engineer, Mr. Blake took a course in electrical engineering at Massachusetts Institute of Technology, after which he became connected with the Sprague Electric Railway & Motor Company, which was then engaged in constructing electric railways in various cities in the United States. From the time he joined the staff of the JOURNAL in 1891 until the present his career and the record of the JOURNAL are almost synonymous.

Morris Buck, for the last two years associate editor of the JOURNAL, becomes managing editor. Prior to joining the staff Mr. Buck was associated with John A. Beeler of New York for seven years in consulting engineering work. In this connection he had charge of important investigations of electric railways throughout the country, including surface, rapid transit and interurban lines. Among the properties which he studied are those of Boston, the Eastern Massachusetts, New York, Philadelphia, Washington, Newark, Richmond, Chicago, Kansas City, New Orleans and others. This work included a wide range of operating, engineering and financial problems, and was done for railways and public officials.

The earlier experience of Mr. Buck included work as engineer for the Westinghouse Electric & Manufacturing

Company and the Mechanical Appliance Company, cost analyst for the Mellon National Bank of Pittsburgh and special apprentice with the Delaware, Lackawanna & Western Railroad. For six years before taking up consulting work Mr. Buck was assistant professor of railway electrical engineering at the University of Illinois. At this time he became well known in the electric railway field for original work done in the solution of electric railway engineering problems by graphical methods and for his text-book, "The Electric Railway." Other teaching experience of Mr. Buck included a year as professor of electrical engineering at Clarkson College of Technology, two years as assistant professor of electrical engineering at New Hampshire State College and one year as instructor at Cornell. He is a graduate of the last university in mechanical engineering, class of 1904, and of the University of Illinois in electrical engineering, class of 1917.

John A. Miller, Jr., who has been assistant editor for two years, becomes associate editor. Prior to joining the paper he was an engineer in the traffic department of the Public Service Railway, Newark, N. J. He entered the service of the railway by taking a course as "cadet engineer," and was one of a comparatively small number of men to complete the full course. He was employed in the maintenance-of-way department, the power houses, the distribution department, the car shops, the time-table department and the traffic department. After he completed this work Mr. Miller served as assistant supervisor at the Montclair carhouse, was in charge of the trainmen's instruction school at Hoboken and was a special instructor on safety cars at Paterson.

Mr. Miller received his early education at the Newark Academy, following which he took the civil engineering course at Yale, graduating in 1915. He served with the First New Jersey Cavalry on the Mexican border in 1916 and was in France during the World War as second and first lieutenant of the 104th Engineers.

Personnel Changes in Benton Harbor

Changes in the management of the Benton Harbor-St. Joe Railway & Light Company, Benton Harbor, Mich., are as follows: George N. Tidd is vice-president, along with Thomas F. English, who has been general manager. Frank B. Ball is secretary and treasurer and R. J. Brown has succeeded J. C. Rohl as superintendent of overhead construction.

G. E. Matt is comptroller of the Oklahoma Union Railway, Tulsa, Okla. E. C. Van Valkenburg is assistant to the general manager. J. A. Ladd is roadmaster and E. D. Nelson is master mechanic. E. F. Blanchard is superintendent of claims, replacing F. E. Kirkpatrick.

W. L. Weston, recently manager of the Nova Scotia Tramways & Power Company, Ltd., Halifax, N. S., has accepted a similar position at Woonsocket, R. I.

T. Fitzgerald Elected Vice-President at Pittsburgh

Thomas Fitzgerald, general manager of the Pittsburgh Railways, Pittsburgh, Pa., has in addition been elected vice-president of the company. Mr. Fitzgerald has been manager of the company since last February. His traction activities date back to 1899, but were interrupted by the war. Following his discharge from the army as lieutenant-colonel in 1919, he opened offices in Pittsburgh as consulting electric railway engineer. During the past few years he has made a comprehensive study of the Pittsburgh Railways system and assisted in the plans for the reorganization. He is a great believer in the efficacy of merchandising transportation, and it was in accordance with ideas advanced by him that the commercial department of the company was organized, as described in the issue of the *ELECTRIC RAILWAY JOURNAL* for April 19, 1924, page 620.

Mr. Fitzgerald was born and educated in Baltimore, graduating from Johns Hopkins University with the degree of Bachelor of Arts in 1898, after which he took one year of post-graduate work. The following year he served as inspector of the Third Avenue Railroad, New York, and then accepted the position of superintendent of the Fairmont & Clarksburg Electric Railroad in charge of railway and electric lighting activities, a position he held until 1902. During the next year he was made general superintendent of the Portsmouth district of the Norfolk, Portsmouth & Newport News Company, in charge of railways and electric lighting in Portsmouth, and Norfolk county ferries, operating between Norfolk, Portsmouth and Berkeley, Va. He also was engaged in special work reporting on physical and operating conditions of the Roanoke Railway.

From 1903 to 1905 Mr. Fitzgerald served as general manager of the Lexington Railway, Lexington, Ky. In 1908 he transferred his activities to Cincinnati, becoming purchasing agent and assistant to vice-president of the Ohio Traction Company, Cincinnati Traction Company, Cincinnati Northern Traction Company and the Indiana, Columbus & Eastern Traction Company. He was promoted in 1907 to assistant general manager of the Ohio Traction Company and Cincinnati Traction Company, which post he retained until 1913, when he was made general manager of these two companies. While serving as general manager he was called upon to make a number of reports on the operating and physical condition of the Columbus, Buckeye Lake & Newark Electric Railway, the Columbus, Newark & Zanesville Electric Railway, the Indianapolis & Northwestern Traction Company and the Columbus & Lake Michigan Railroad.

H. P. Garland has succeeded Charles H. Prescott as president of the Biddeford & Saco Railroad, Biddeford, Me. J. B. Stride, besides performing the duties of treasurer and secretary, is now claim agent. E. O. Hill, formerly superintendent and purchasing agent, now is title of general superintendent.

F. D. Hunt, traffic manager of the Portland Electric Power Company, Portland, Ore., since 1908, is also performing the duties of general manager of the Willamette Valley Southern Railway, Oregon City, Ore. Mr. Hunt has been in the railway business since 1894.

Henry W. Darling has resigned as treasurer of the General Electric Company, Schenectady. In accepting the resignation the directors elected him a vice-president with such duties as shall be assigned to him by the president. Mr. Darling has been intimately associated with the financial affairs of the General Electric Company from the time the company was organized in 1892 by the consolidation of the Edison General Electric and the Thomson-Houston companies. He became identified with the Edison interests in the winter of 1890-91, with headquarters in New York.

R. S. Murray has been elected treasurer of the General Electric Company, Schenectady, N. Y., to succeed Henry W. Darling. Mr. Murray entered the employ of the General Electric Company in 1893, a year after its organization. He was first attached to the Boston office. In 1899 he went to Australia and from there to South Africa in connection with the formation of the Australian General Electric Company and the South African General Electric Company. In October, 1907, he went to Schenectady and three years later became assistant treasurer.

J. Norman has been appointed auditor of the Montreal & Southern Counties Railway, effective Dec. 1. His headquarters are at St. Lambert, Que.

Lawrence Killam of the Royal Securities has become manager of the Nova Scotia Tramways & Power Company, Ltd., Halifax, N. S. Mr. Killam was formerly manager of the Inverness Mines, N. S.

William A. Gill will retire in January as vice-president and a director of the Columbus Railway, Power & Light Company, Columbus, Ohio. Mr. Gill has been a member of the board for the last eleven years. While he has recently disposed of his common stock holdings in the company, Mr. Gill retains a large interest in the preferred stock. He is in his eighty-third year.

Obituary

Frank O'Keefe, who was division superintendent of the Fresh Pond Division of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., when he retired from active service on June 25, 1919, is dead. Mr. O'Keefe spent about 37 years in active service on the surface lines of Brooklyn, starting about 1882 as a tow-boy on the Smith Street line. He was 57 years old.

Cyrus C. Marsh, until recently general manager of the Blue Ridge Traction Company, Allentown, Pa., a position he held for 15 years, died on Dec. 9, following an illness of two years. Besides his connection with the traction company, Mr. Marsh was a director and one of the organizers of the Citizens' National Bank, Slatington, Pa. He was 63 years old.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

New Headquarters Building at Davenport

Erection of a five-story fireproof office building to house the increased headquarters personnel of the United Light & Power Company has been announced by B. J. Denman, vice-president of that company. The building will cost about \$500,000. It will be located at Second and Perry Streets, a site which is centrally located and readily accessible from any part of the city.

This structure will be the first wing of a building that eventually will be eight stories high, cover a city block in frontage and cost \$2,000,000. The building now to be begun will have a frontage of 132 ft. and a depth of 98 ft. In addition to housing the executive offices of the United Light it will also be occupied by the personnel of the Peoples Light Company and of the Tri-City Railway.

There will be two entrances, one to the office building and the other to the retail salesroom of the Peoples Light Company, which will occupy a considerable portion of the first floor. The office of the railway cashier will also be at the rear of the ground floor. On the second floor, grouped about a balcony, will be the private offices of the executives of the Peoples Light Company and the operating officials of the Tri-City Railway.

On the third floor will be located the private offices of Vice-President Denman, General Manager H. E. Weeks of the securities department and his assistants.

The offices and working rooms of the engineering department and the private offices of G. T. Shoemaker, electrical engineer, also the statistical offices, will be located on the fourth floor. The fifth floor space has not yet been assigned.

Big Sales for Fageol Motors

The Fageol Motors Company reports total sales for the first eleven months of 1924 in excess of \$4,044,000. Two new factory units have been added, one a new brick building in Oakland, which more than doubles the company's coach assembly space, and a chassis plant at Kent, Ohio, where Fageol Safety Coach chassis are being made for delivery to the Fageol Motors Company of Ohio, a separate corporation, which builds the bodies and markets the complete coaches in the territory east of the Rocky Mountains.

Rolling Stock

Arkansas Central Power Company, Little Rock, Ark., has received eight new one-man safety type cars, bids for which were referred to in the *ELECTRIC*

RAILWAY JOURNAL, issue of June 7, 1924. The cars were built by the American Car Company, St. Louis, Mo., and cost, on delivery, \$15,000 each. The seating capacity of each is 44. The body construction is of steel and the cars are equipped with safety devices.

Track and Line

New York, N. Y.—The Board of Transportation approved the form of contract and directed the advertisement for bids for the construction of two sections of the Washington Heights subway line. One section is under Eighth Avenue from 112th Street to 122d Street and St. Nicholas Avenue. Bids for the construction of this section will be received on Jan. 26, 1925. The other section runs along St. Nicholas Avenue from 122d Street to 133d Street. Bids for the construction of this section of the line will be received on Jan. 29, 1925.

Boston, Mass.—The Metropolitan Planning Division has submitted a report to the Massachusetts Legislature recommending that the Boston Elevated Railway extend its rapid transit service from Governors Square before it spends much money in developing the service from Everett and to Malden. It also says that the Lechmere Square extension through Somerville and Arlington and Lexington should be made before the Malden line improvement is carried out because of the larger population that will be served. On the matter of taking over the Saugus branch of the Boston & Maine Railroad the planning board takes the position that it should not be attempted without further studies. It is suggested that it would be too expensive for the Elevated to take the whole branch, and to take only a part of it does not meet with approval from the Boston & Maine. The division wants another year to study this problem. It opposes the proposition to build an underground station in Everett, and says that the present surface station is giving reasonably good service.

Trade Notes

Diamond Power Specialty Corporation, Detroit, Mich., has appointed the Midwest Machinery Company, 104-106 South Main Street, St. Louis, Mo., as its representative for the territory of Missouri, adjacent to St. Louis, south of and including Springfield and Decatur, Ill. The Midwest Machinery Company includes among the members of its staff of officials Messrs. Stone and Proetz, men widely known in the power plant equipment field.

C. B. Starr has joined the Robert June Engineering Management Organ-

ization, 8835 Linwood Avenue, Detroit, Mich. He was assistant mechanical engineer with the Duff Manufacturing Company of Pittsburgh and later served in the capacity of sales engineer with the Detroit office of the Wayne Tank & Pump Company.

Laclede Steel Company, St. Louis, Mo., has sold its forging plant at East St. Louis, Ill., to a new company to be known as the St. Louis Forgings Company, a subsidiary of the Standard Forgings Company, Chicago, with the same general officers as the Standard Forgings Company. The production of car and locomotive axles and forgings and the operation of the plant generally under the new ownership will be continued as heretofore. The St. Louis Forgings Company opened an office on Jan. 2, 1925, at 521 Security Building, St. Louis, Mo., through which information respecting sales and deliveries may be obtained, and thus the company will keep in close contact with customers in the St. Louis district and the Southwest. The general offices of the company will be in the Railway Exchange Building, Chicago.

Economy Electric Devices Company, Chicago, Ill., has received an order from the Nashville Railway & Light Company, Nashville, Tenn., for additional Economy meters with which to equip completely all active motor cars. The present order comes as a result of the successful use of meters on several lines during the past two years and covers approximately 140 meters for delivery and installation during 1925. An order was also received from the Aurora, Elgin & Fox River Electric Company, Aurora, Ill., for 56 additional inspection dial Economy meters with which to equip all remaining active cars.

New Advertising Literature

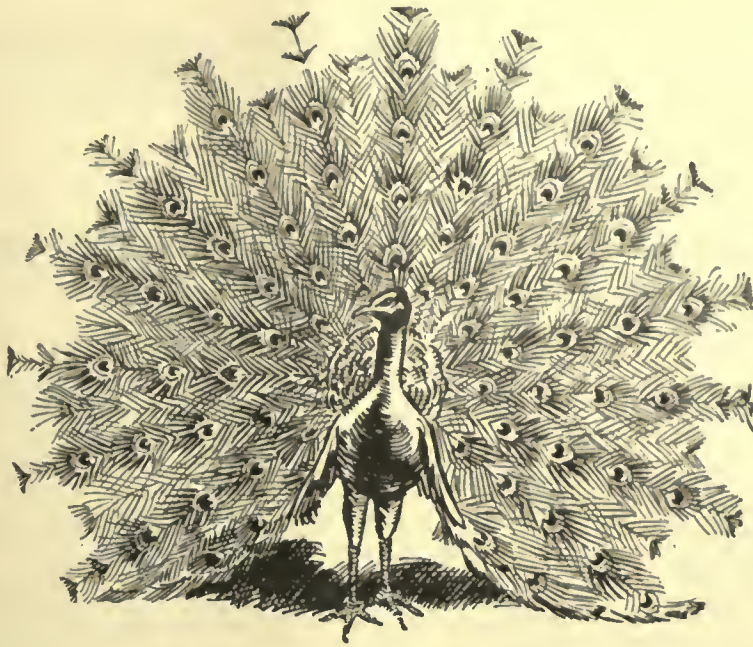
Monitor Controller Company, Baltimore, Md., has issued Bulletin 67, describing the Monitor edgewound resistor. The bulletin states that this new resistor is especially well adapted to use on electric cars and electric locomotives. Its advantages as compared with the cast-iron grid are discussed in the bulletin.

Metal, Coal and Material Prices

Metals—New York		Dec. 31, 1924
Copper, electrolytic, cents per lb.	14.90	
Copper wire base, cents per lb.	17.25	
Lead, cents per lb.	9.70	
Zinc, cents per lb.	8.12	
Tin, Straits, cents per lb.	58.25	

Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	\$4.075
Somerset mine run, Boston, net tons	2.15
Pittsburgh mine run, Pittsburgh, net tons	1.875
Franklin, Ill., screenings, Chicago, net tons	1.925
Central, Ill., screenings, Chicago, net tons	1.925
Kansas screenings, Kansas City, net tons	2.50

Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	\$6.75
Weatherproof wire base, N. Y., cents per lb.	18.50
Cement, Chicago net prices, without bags	2.20
Liaised oil (5-lb. lots), N. Y., per gal.	\$1.18
White lead in oil (100-lb. keg), N. Y., cents per lb., carload lots	0.157
Turpentine (bbl. lots), N. Y., per gal.	0.85



1925

1925

Braking Resolutions
PEACOCK BRAKES

Investigate Now!

Speaking of New Year's resolutions—we ask you only to resolve upon a careful study of the hand brake problem for your cars—both new and old. Investigate the *adequacy*, the *safety* and the *maintenance cost* of your present equipment. Look into the experience of other companies which have found Peacock Brakes to be the road to true economy and safety.

To the entire industry we extend our best wishes for a full share of success and prosperity throughout the ensuing year.

National Brake Company, Inc.

890 Ellicott Square, Buffalo, N. Y.

Bankers and Engineers

Ford, Bacon & Davis Incorporated Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation

Engineers—Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

EXAMINATIONS REPORTS APPRAISALS
ON

INDUSTRIAL AND PUBLIC SERVICE PROPERTIES

NEW YORK

BOSTON

CHICAGO

THE BEELER ORGANIZATION

ENGINEERS AND CONSULTANTS

Traction-Traffic-Equipment-Power

COORDINATION OF SERVICE—IMPROVED OPERATIONS

INCREASED TRAFFIC—FINANCIAL REPORTS

APPRAISALS—MANAGEMENT

52 Vanderbilt Ave.

New York City

SANDERSON & PORTER ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT and POWER PROPERTIES

CHICAGO

NEW YORK

SAN FRANCISCO

A. L. DRUM & COMPANY

Consulting and Constructing Engineers

VALUATION and FINANCIAL REPORTS

RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE

COMMISSIONS

CONSTRUCTION AND MANAGEMENT OF
ELECTRIC RAILWAYS

230 South Clark Street
Chicago, Ill.

215 South Broad Street
Philadelphia, Pa.

ALBERT S. RICHEY ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS—APPRAISALS—RATES—OPERATION—SERVICE

ENGELHARDT W. HOLST

Consulting Engineer

Appraisals, Reports, Rates, Service Investigation,
Studies on Financial and Physical Rehabilitation
Reorganization, Operation, Management

683 Atlantic Ave., Boston, Mass.

JAMES E. ALLISON & CO. Consulting Engineers

Specializing in Utility Rate Cases and
Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.

JOE R. ONG

Consulting Transportation Engineer

Specializing in Traffic Problems and in Methods to
Improve Service and Increase
Efficiency of Operation

PIQUA, OHIO

STEVENS & WOOD, INC.

Design and Construction of Power Stations
Railroad Electrification, Industrial Plants

REPORTS AND APPRAISALS

Management and Financing of Utilities and Industrials

Mahoning Bank Bldg.
Youngstown, O.

120 Broadway
New York

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly Pass—Differential Fares
Ride Selling

143 Crary Ave., Mt. Vernon, N. Y.

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells

Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management Operation Construction

43 Cedar Street, New York City

J. ROWLAND BIBBINS

Engineer—2301 Connecticut Ave., N. W. Washington, D. C.

TRANSPORTATION SURVEYS

Organized Traffic Relief and Transit Development
Co-ordinating Motor Transport, Railroad and City
Plans, Service, Routing, Valuation, Economic Studies

EXPERIENCE IN 20 CITIES

Dwight P. Robinson & Company

Incorporated

Design and Construction of

Electric Railways, Shops, Power Stations

125 East 46th Street, New York

Chicago Youngstown Atlanta Philadelphia
Los Angeles Montreal Rio de Janeiro

KELLY, COOKE & COMPANY

Engineers

149 BROADWAY
NEW YORK

424 CHESTNUT STREET
PHILADELPHIA

To Electric Railway Companies!

It is difficult, with cold type, to express the appreciation we hold for the many good things that have come to us through the *Good Will* of the Street Railway Fraternity.

Year by year we have earnestly sought to merit your further favors—we have sought to broaden the bonds of good feeling—we have sought your increased *Good Will*—and we have not been disappointed.

And so we profess, anew, our allegiance to our many friends and wish every one of you a New Year filled with Prosperity and Happiness.

St. Louis Car Company

St. Louis, Mo.

"The Birthplace of the Safety Car"

The Most Successful Men in the Electric Railway

Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.

Engineers and Contractors

SYRACUSE, N. Y.

DAY & ZIMMERMANN, INC. ENGINEERS

DESIGN - CONSTRUCTION - REPORTS
VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

Bureau of Commercial Economics, Inc. Industrial Engineers

Organization • Methods • Layout and Facilities
Public and Industrial Relations

72 West Adams Street • CHICAGO

C. B. BUCHANAN
President

W. H. PRICE, JR.
Sec'y-Treas.

JOHN F. LAYNG
Vice-President

BUCHANAN & LAYNG CORPORATION

Engineering and Management, Construction,
Financial Reports, Traffic Surveys
and Equipment Maintenance

BALTIMORE
825 Equitable Bldg.

Phone:
Hanover 2142

NEW YORK
49 Wall Street

THE P. EDWARD WISH SERVICE

50 Church St.
NEW YORK

Street Railway Inspection
DETECTIVES

131 State St.
BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

HUMAN ENGINEERING

Railway Audit and Inspection Company, Inc.

Franklin Trust Building, Philadelphia

Boston
New Orleans

New York
Pittsburgh

BRANCHES

Baltimore
Chicago

Atlanta
St. Louis

HUBBARD

*The hardware makes
the line
Hubbard makes the
hardware*

Line Hardware for the Electric Railway

Pierce Forged Steel Pins.
Pierce Insulated Pole Bands.
Hubbard Guy Clamps.
Hubbard Trolley Pole Bands
Hubbard Turnbuckles.
Hubbard Pole Bands with
pull-off rods.
Bo-Arrow Arms.
Steel Cross Arms.
Drop Forged Eyebolts, etc.

—just a few of the more important items listed in the Hubbard Catalog No. 24.

Bear in mind that the Hubbard Plants are the largest of their kind in the world producing Standard Pole Line Hardware for the construction and maintenance of trolley catenary and transmission systems of every type.

And Hubbard Service includes 124 jobbers throughout the United States who carry complete stocks of Hubbard Standard Pole Line Hardware and Pierce Construction Specialties. No need to carry emergency stocks,—there is always a Hubbard jobber close at hand.

Any special problems which may present themselves, or any special materials which may be needed,—just submit details to our engineering department!

HUBBARD & COMPANY

Pittsburgh

OAKLAND, CAL.

Chicago



Pierce Forged Steel Pins



Hubbard
Bo-Arrow Arms



Hubbard Pole Bands
With Pull-off Rods



Hubbard Heavy Rolled
Steel Guy Clamps

HUBBARD



The Storm-test of Service

Five years of dependable service through varying temperatures, high winds, heavy snows, rain and thaws—such is the performance of 6,000,000 pounds of Anaconda Copper Trolley Wire, Feeder Cable and Signal Line Wire now in use on the Chicago, Milwaukee & St. Paul Rocky Mountain electrification.

For uninterrupted service specify Anaconda Copper Wire.

Anaconda
Copper Mining
Company
Rolling Mills Dept.
Chicago, Ill.

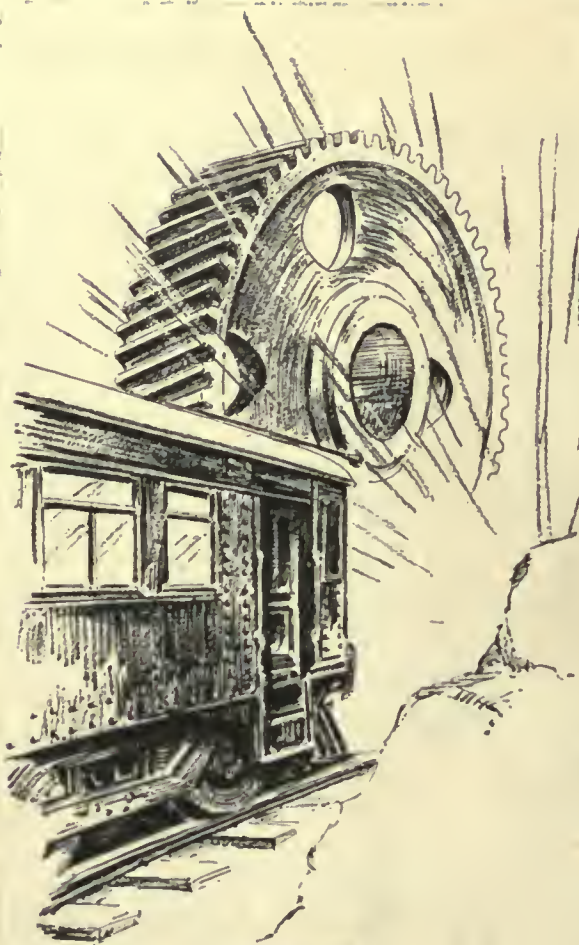


The
American Brass
Company
25 Broadway
New York

ANACONDA

TROLLEY WIRE

“On sche



Nuttall Standard Helical Gears Modern Gears for the modern car

There is no longer any doubt as to the superiority of helical gears over spur gears for traction purposes, when properly used.

Two Nuttall Helicals in service in Washington, D. C., have already given more than 172,160 miles; a set used by the West Penn Railways has 500,000 miles to its credit, and numerous other large properties have reported equally favorable results. Noisy spur gears have ceased to be a necessary evil.

Nuttall BP Helical Gears wear longer and cost less in the long run, to say nothing of savings in maintaining electrical equipment through the elimination of gear vibration, and the public goodwill value of quiet, smooth-riding cars.

For the meshing of Nuttall Helical Gears, at any speed, is like the turning of a screw,—smooth, practically silent, shockless! There is no grinding and no chattering.

The secret lies in the $7\frac{1}{2}^\circ$ Helix Angle, the long and short addendum tooth, and the Nuttall BP Heat Treating Process. The results have more than justified the years of research which Nuttall engineers have spent on the perfection of this modern gearing for electric traction.

We will be glad to cooperate in practical tests on your own property.



Nuttall

Module" for 1925



Form 13-E Nuttall
Trolley Bases

Nuttall

Trolley Bases, Harps, Wheels, Pantagraphs Standard on up-to-date roads

Nuttall engineers have given particular attention to perfecting and rendering these vital parts more reliable in operation, less susceptible to wear, and less costly of maintenance.

Form 13-E Nuttall Trolley Base for instance, has among other distinctive features an exclusive roller-bearing swivel, so designed that oil leakage is impossible, while water and dust cannot enter.

Timken Roller Bearing Trolley Base U.S. No. 20 is equipped with these famous bearings in specially hardened race-ways to meet trolley operating conditions.

Nuttall Harps, Wheels and Pantagraphs are all equally good in design and construction.

Nuttall Specifications on the
new cars for the New York,
Westchester & Boston Ry. Co.

Door fixtures, motor	National Pneumatic
Curtain material	Forseyth
Destination signs	
Door-operating mechanism	
Door gear	
Gears and pinions	
Nuttall BP pinion and flexible gear	
Hand brakes	Black
Heater equipment	Golden Glow
Headlights	Bronze
Journal bearings	Symington—5 1/2 in. x 10 in.
Journal boxes	Westinghouse 409-B, inside hung
Paint	Veluvine enamel
Sash fixtures	O. M. Edwards
Seats	Heywood-Wakefield
Seating material	Pantasoto
Slack adjuster	Westinghouse Type L
Spokes	Steel elliptic
Step treads	Kass
Pantograph	Nuttall U. S. No. 13
Pantograph shoe	No. 14, standard
Trucks	Standard
Ventilators	Garip
Wheels:	
for truck	42-in. steel
for truck	36-in. roll

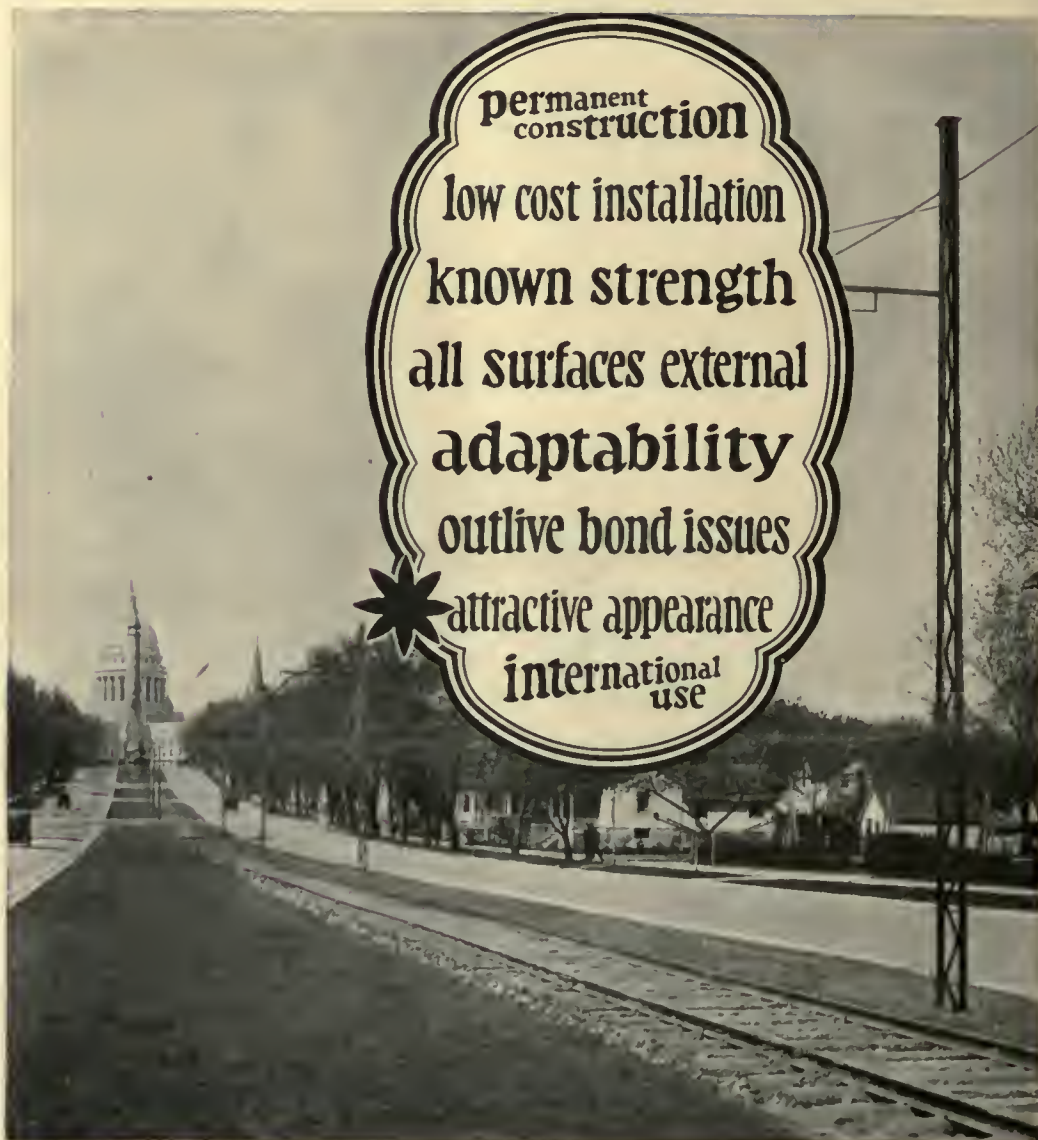
Write for Bulletins giving full details

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices
are Sales Representatives in the United States for
the Nuttall Electric Railway and Mine Hoisting
Products. In Canada: Lyman Tube & Supply Co.,
Ltd., Montreal and Toronto.



Nuttall



permanent
construction

low cost installation

known strength

all surfaces external

adaptability

outlive bond issues

attractive appearance

international
use

Attractive Appearance

The attractive and pleasing appearance of Bates poles is a decided factor in their preference for municipal use.

For instance — "We have received a number of compliments from people in the districts where the poles are in use as to the beauty of their appearance on the street, and have had requests from several other districts to rebuild their line with this kind of construction."

The rugged simplicity of Bates poles makes them particularly appropriate for use where public demand for beauty is a factor. Bates engineers will be glad to figure at your request on your requirements.

Bates **E**xpanded **S**teel **T**russ **C**o.

Illinois Merchants Bank Bldg.

Chicago, Ill., U. S. A.

BATES ONE PIECE EXPANDED STEEL POLES



50 of these cars

Now being constructed for Chicago Surface Lines. Designed for One-man, Two-man or Two-car train units under the design and specifications of the Chicago Surface Lines.



Two-car train unit for Chicago Surface Lines

Completely equipped shops for building cars of your design and specifications.

10 LIGHT WEIGHT NOISELESS CARS

now being constructed for Duluth, Minn., Stillwater, Minn., and Grand Rapids, Mich.



LIGHT WEIGHT NOISELESS ONE-MAN TWO-MAN CAR

22,000 to 24,000 Pounds Complete, Length 36 ft., Seats 43

10% faster schedule speed, 40% saving in power compared with standard weight car

Light Weight Car on W. J. Smith Noiseless Light Weight Trucks equipped with Hyatt Roller Bearings and Concentric Clasp Axle Drum Brakes provides Faster Acceleration, Faster and More Coasting, Faster and More Comfortable Braking, resulting in Faster Schedules, with greatly reduced Power Consumption and Less Automobile Interference.

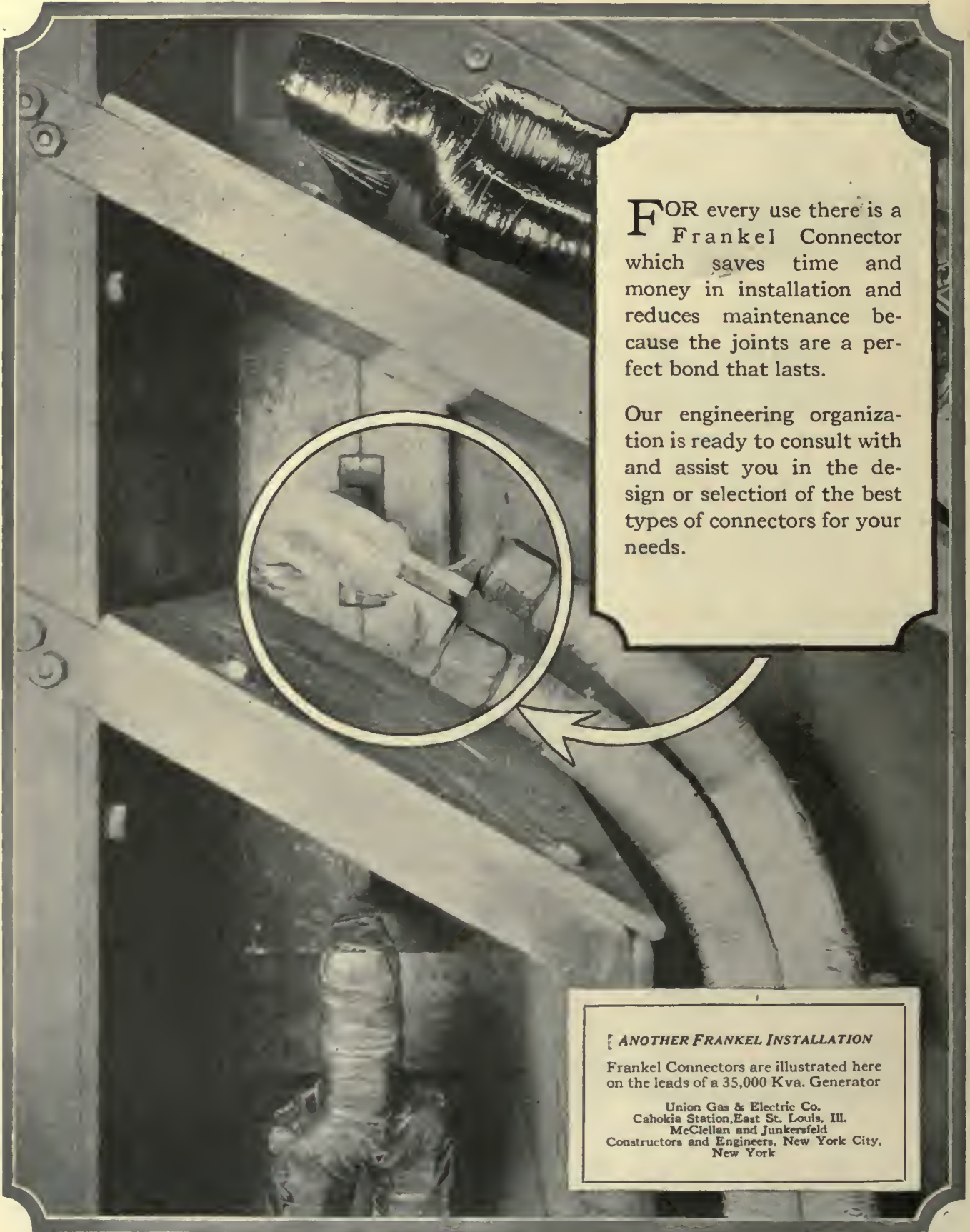
"Send Us Your Specifications"

Light Weight Noiseless Electric Street Car Company

1745 Illinois Merchants Bank Building, CHICAGO

Manufacturers of Electric Street Cars

Shops at St. Paul, Minn.



FOR every use there is a Frankel Connector which saves time and money in installation and reduces maintenance because the joints are a perfect bond that lasts.

Our engineering organization is ready to consult with and assist you in the design or selection of the best types of connectors for your needs.

ANOTHER FRANKEL INSTALLATION

Frankel Connectors are illustrated here on the leads of a 35,000 Kva. Generator

Union Gas & Electric Co.
Cahokia Station, East St. Louis, Ill.
McClellan and Junkersfeld
Constructors and Engineers, New York City,
New York

FRANKEL SOLDERLESS CONNECTORS

DISTRIBUTORS—Sales Offices in all Principal Cities

Westinghouse Elect. & Mfg. Co.

Western Electric Company

Do You Get All You Are Entitled to When You Purchase Ties?

SUCCESSFUL tie preservation demands a sound tie to start with. A decayed or unsound tie cannot give satisfactory service no matter how well it is treated.

The extreme care and personal supervision of ties immediately after they are cut is in large measure responsible for the soundness and longevity of *International Ties*.

To secure sound ties, they must be properly cut and properly followed from the tree to the treating yard. The important fact to be remembered is that they must be *Removed Quickly from the Woods*.

This period in the production of *International Ties* is given particular attention for its execution has a direct bearing on the ultimate life of the tie.

International Ties are removed quickly from the decay producing conditions of the woods, transported to the right of way, inspected, graded and shipped to the seasoning yard, where they are free from all vegetation.

Here the ties are carefully stacked to allow maximum circulation of air and promote early seasoning with minimum danger of decay.



*The International Dating Nail
is our guarantee of quality
and your protection*

International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas
Galveston, Texas



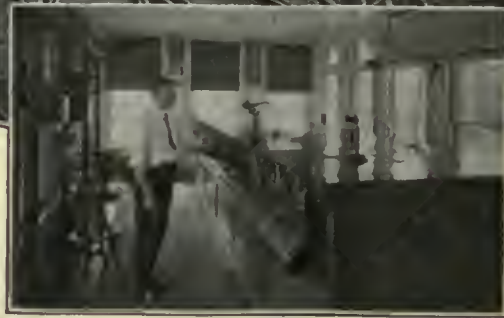
International

Standard Specification Ties

Modern Signal Protection



Electro-Pneumatic
Interlocking at
Terminal Station
of Philadelphia &
West Chester
Traction Co.



At the new Philadelphia Terminal Station of the Philadelphia & West Chester Traction Co., UNION ELECTRO-PNEUMATIC INTERLOCKING allows car movements to be speeded up and insures against conflict of simultaneous movements.

Let one of our engineers study your operating conditions and co-operate with you in considering what Interlocking and Automatic Block Signals will do for your Railway.



Union Switch & Signal Co.

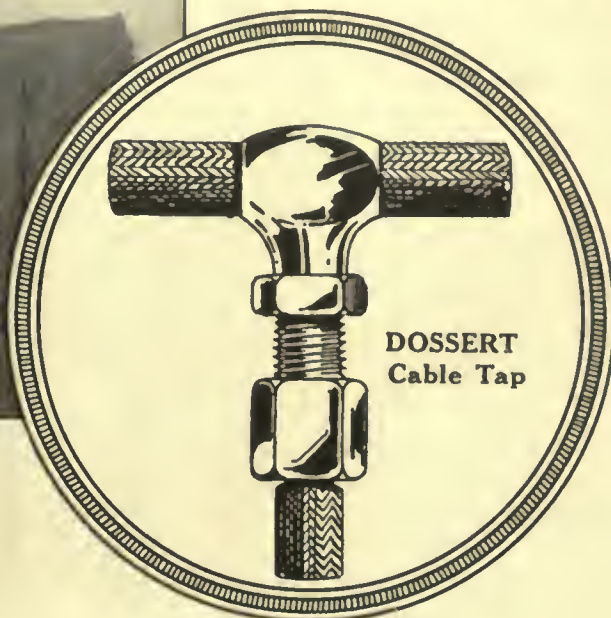
SWISSVALE, PA.



This tap off the main feeder



made with this
DOSSERT
in 5 minutes



A man can waste a lot of time—and spoil a lot of insulation—by the old method of doing this job.

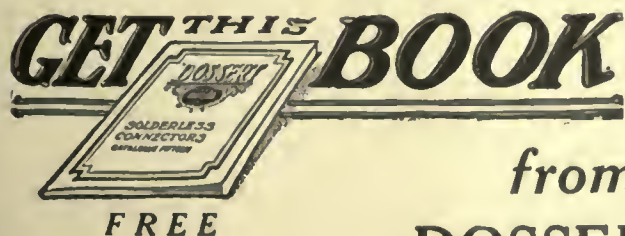
Now he goes up with a Dossert and a wrench—and does a perfect job, regardless of his experience, in a few minutes.

There are but few expert splicers in any

construction or repair gang—but *every* man is expert on Dossert connections.

Tests after connection will show you that the Dosserts run at as low temperature as the wires connected to them.

You'll find many suggestions on time saving in the Dossert Book—which will be mailed you gratis on request.



from
DOSSERT & COMPANY

H. B. LOGAN, President
242 West 41st St., New York City



The nation wide Collier Organization

will maintain the same standards
of service in 1925 that it has up-
held in car card advertising for
more than thirty years.





Superior Aerostructure Bodies Are 25% Lighter

The new Superior Bodies are a full 25% lighter and yet they are as rigid as any body. The same construction that results in this big reduction in weight at the same time adds greatly to strength.

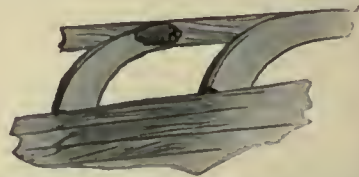
The weight reduction on these new Superior Bodies is equal to the weight of seven passengers. Yet the rigidity and strength are there. That means greater service and lower costs.

Many of the foremost chassis manufacturers have sent engineers to our plant to see these highly improved body manufacturing methods in practice. They have gone away thoroughly convinced of the marked advantages of Superior Aerostructure bodies.

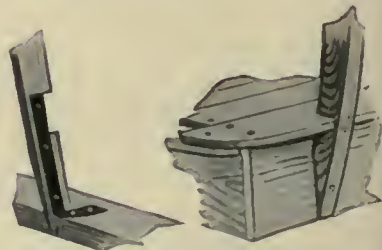
Write for full information or send an engineer to see Superior Aerostructure bodies in the making.



This illustration shows the type of bend used at all curves in every Superior body. All bends are made with laminated wood, creating a joint that in wood working is the equivalent of a weld in metal working. These laminated bends are as strong as though the wood grew in that form for our convenience.



Above is shown the old style cross grain section that was formerly used. The lack of strength and clumsiness is evident. Note the irons for bracing. These are not needed with the new construction. This is one place where weight is saved.



Another big improvement in Superior Aerostructure bodies is the use of vertical sills. At the left is shown the old style construction. Note the weak way in which pillars are tied in and braced with heavy irons. At the right is shown the new vertical sill with firm anchorage for body pillars that makes bracing with irons unnecessary.

THE SUPERIOR MOTOR COACH BODY CO.

LIMA, OHIO

Aerostructure

**SUPERIOR
BODIES**

Coach Bodies



Steel Pole Stability

Truscon Steel Poles are constructed throughout of copper bearing steel and in a truss formation which lends extraordinary strength and stability. The metal is concentrated at the corners in such a way as to adapt the structure especially to resist loads both longitudinally and transversely to the line. Interruption of service due to storms and other unusual stresses is reduced to a minimum possibility by the use of steel poles.

None of the ills that wood is heir to effects Truscon Steel Poles. They are fireproof and copper bearing steel construction insures extra long life and great durability. In appearance they are greatly superior and the surface does not deteriorate and become unsightly with age. Maintenance of steel poles is practically nothing and they are surprisingly low in first cost.

Return coupon for data on Truscon Steel Poles and Steel Windows.

TRUSCON STEEL COMPANY, Youngstown, Ohio

Warehouses and Sales Offices from Pacific to Atlantic.

For addresses see phone books of principal cities

Canada: Walkerville, Ont. Foreign Div.: New York

TRUSCON

TRUSCON
STEEL
CO.

COPPER-BEARING STEEL POLES



TRUSCON Steel Windows conform to every structural and architectural demand for Powerhouses. Truscon Engineers are specialists in daylighting and control of natural ventilation in Powerhouses. Central Station Engineers everywhere are making use of this service in designing new Powerhouses.

TRUSCON STEEL COMPANY, Youngstown, Ohio

Please send me

Free booklet, "Truscon Steel Poles."
Information on Steel Windows for Powerhouses.

Name

Address

E. R. J. 1-3-25



Why are you buying new

YOU may be opening new routes—buying more coaches to handle increased traffic—replacing worn-out or obsolete equipment.

Whatever the reason that necessitates this expenditure of money, whether the amount is large or small, you cannot be certain that you have made the wisest purchase for your company until you have thoroughly investigated SAFEWAY Six Wheel Construction.

No matter how much experience you have had in the operation of buses, the time you devote to this investigation will be profitably spent. This is true because there is no four wheel vehicle whose performance can be compared with the Six Wheeler.

SAFEWAY Six Wheel transportation represents a form of bus operation which is superior to anything that can be accomplished with four wheel equipment. Before you complete any plans for the purchase of new buses you should understand the sound engineering principles on which Six Wheel construction is based and the resulting advantages both to passenger and operator.

Until you have actually ridden in a Six Wheeler you cannot realize how comfortably a large number of people can be carried over all sorts of roads.

Catalog and other information will be mailed on request

THE SAFEWAY

M a d e b y T h e S i x W h e e l C o m p a n y



equipment this year?

Until you have seen how Six Wheel construction absorbs road shocks and vibrations, you cannot appreciate the extent to which it minimizes body depreciation.

You need to drive this coach, or see it driven, to understand why the Six Wheeler, with its six point road contact and great braking area, cannot be equaled for safe operation. This is especially true on icy streets and hilly, snow-covered roads.

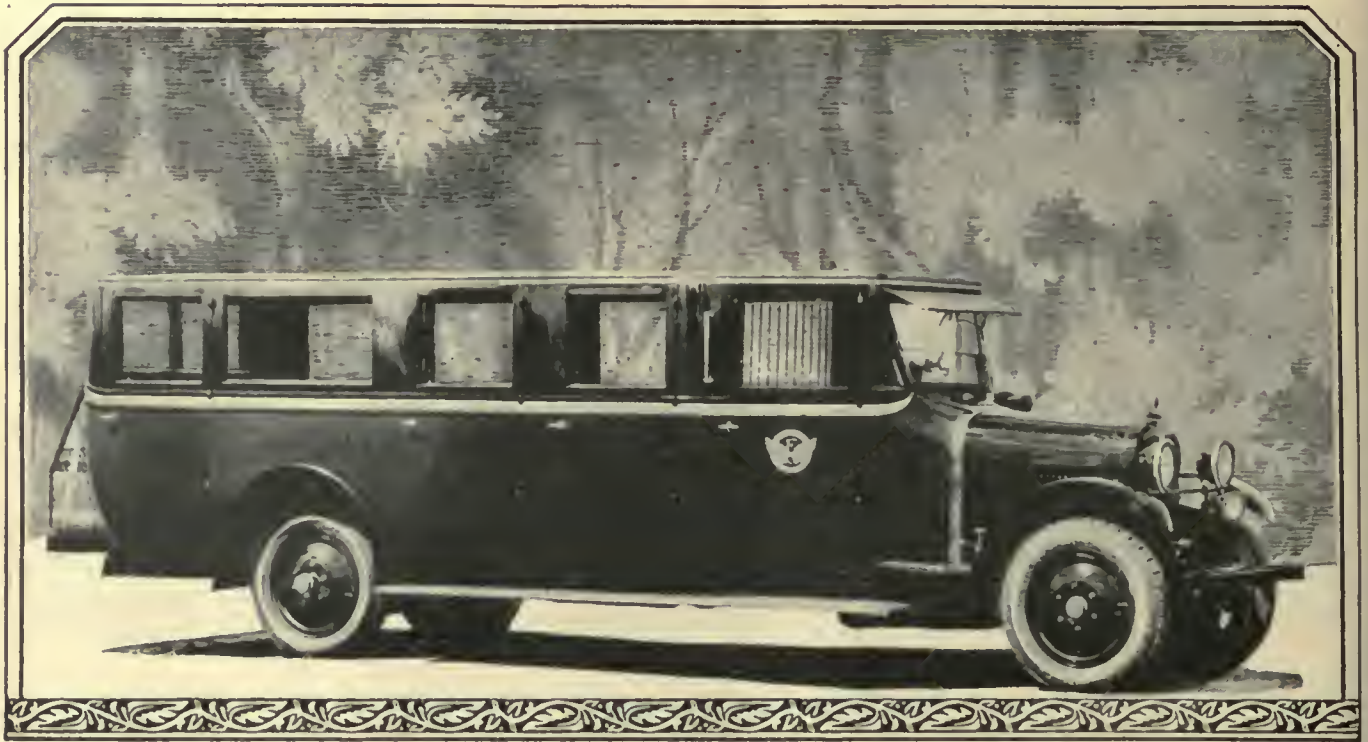
These are "high spots"—advantages in SAFEWAY construction that are evident in a single ride. Continued operation reveals many others, less obvious but equally important in the insurance of efficiency and profit in bus operation.

Finally, there is this to consider. Whether you spend ten or a hundred thousand dollars in 1925 for new equipment, your supreme desire must be for coaches that in the coming years will not have depreciated through wear or obsolescence We believe you cannot be certain of this if you buy four wheel equipment We know that on both these counts money spent for SAFEWAY Coaches in 1925 will continue to be a profitable and satisfactory investment for many years.

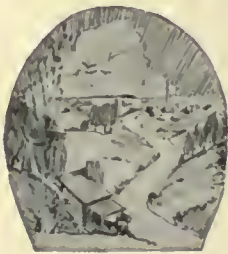
Catalog and other information will be mailed on request.

SIX-WHEELER

1800 W. Lehigh Avenue, Philadelphia, Pa.



Good Roads and Good Busses— Make Highway Transportation



THE vision of years has been fulfilled for ideal and dependable highway transportation. Good roads and the recent development of Motor Busses have been tremendously important factors in bringing together increasing numbers of progressive American communities. With these were the problems of road adaptability of bus bodies for intercity travel.

Twenty-two years of body building have enabled Auto Body engineers to perfect principles that are today dominant in the industry. Riding comfort—style—lightness, with rugged construction for endurance are a few of the distinctive features.

Engineering ability and manufacturing experience, combined with modern equipment and large plant facilities, have made A B C bodies the standard of leading chassis manufacturers.

THE AUTO BODY COMPANY

LANSING, MICHIGAN



Designers and Manufacturers of Motor Coach and Bus Bodies & Open and Enclosed Automobile Bodies



More trips—more *passengers* *more* profits every day

Electric railways are turning to modern, luxurious Pierce-Arrow motor coaches as an *additional* source of profit.

The public today demands speed, comfort and safety. Pierce-Arrow coaches are powered by six-cylinder engines. Speeds from 45 to 50 miles per hour can be maintained *with safety*. The luxuriousness of the roomy, solidly built bodies can be compared to that of a parlor car.

These modern coaches meet modern demands. They handle with the ease of high-powered touring cars. They glide along swiftly and silently with the smoothness of a Pierce-Arrow limousine. Vibration is noticeably absent.

* * *

Our engineers will be glad to demonstrate these modern coaches to railway representatives and to discuss their profit-earning ability.

THE PIERCE-ARROW MOTOR CAR COMPANY, *Buffalo, N.Y.*

Standard \$4600
Chassis

Terms if desired

for 196-inch wheelbase, \$4750 for 220-inch wheelbase, at Buffalo; including starter, battery, generator, solid tires and electric lights. Pneumatic tires and disc wheels optional at extra cost. Either chassis will accommodate the Sedan, sight-seeing or pay-enter types of wood or steel bodies, ranging from 18-passenger capacity upward.

**Pierce
Arrow**
SIX-CYLINDER
MOTOR COACHES

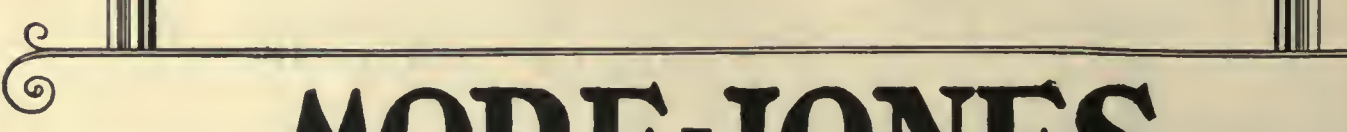


QUALITY
SERVICE
ECONOMY
SECURITY

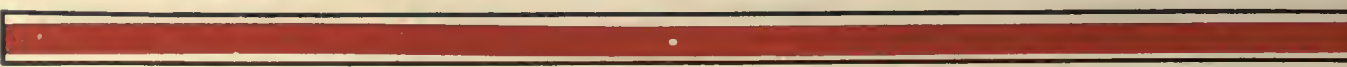
*Quality products that pay
liberally in service results*

Confidence in More-Jones Quality Products results wherever these products are put to the test. This confidence is well founded for the simple reason that these products, all the way thru, possess the vital qualities that mean real service. More-Jones ability to produce such exceptional products is evidenced by highly successful applications in every instance. Particularly is this fact emphasized in street car service where long runs and capacity loads prevail. Our facilities are such that you can be assured of uniformity of the product. That is just another reason why buyers of street car equipment, who have had the experience, specify More-Jones Quality Products. Consider your own service requirements and your maintenance problem, then put it up to More-Jones.

More-Jones Brass & Metal Co.
ST. LOUIS, MO.



**MORE-JONES
QUALITY PRODUCTS**





"Tiger" Bronze Axle and Armature Bearings.

The exceptional toughness and anti-frictional qualities of "Tiger" Bronze insures great strength and a very slow and even rate of wear. These qualities result in a perfect bearing alignment and greater mileage. "Tiger" Bronze will save its cost many times over, every year.

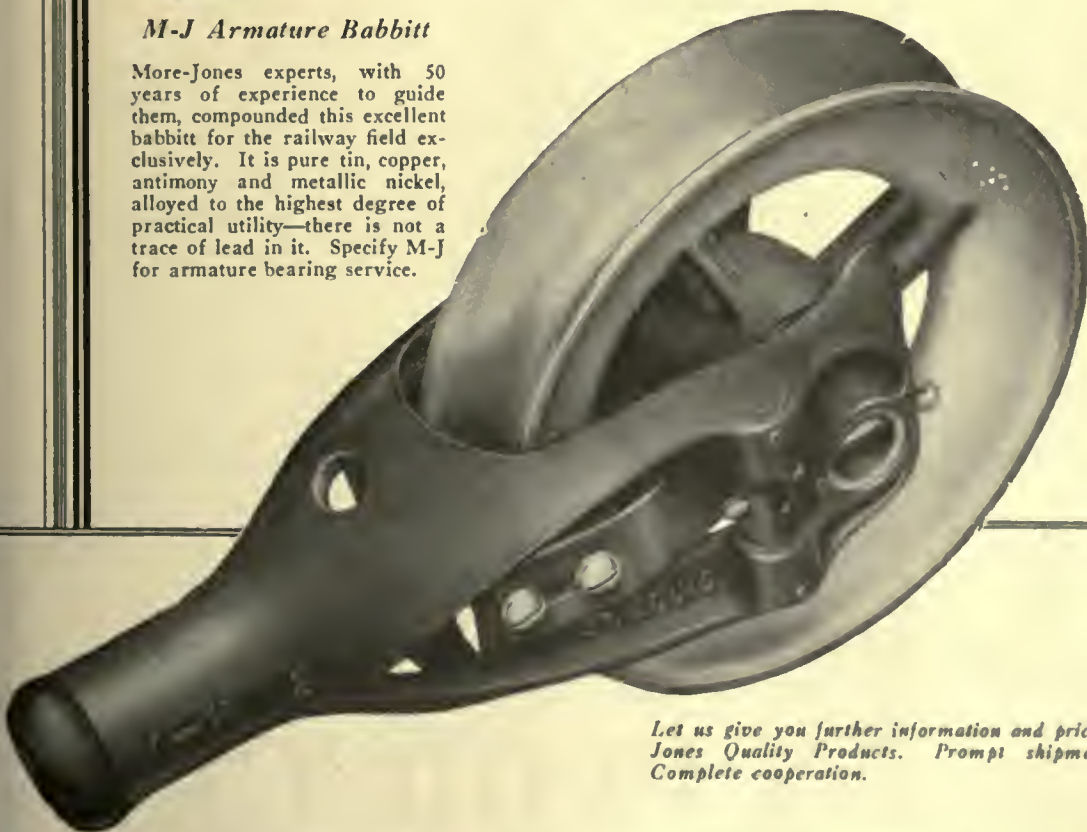


M-J Armature Babbitt

More-Jones experts, with 50 years of experience to guide them, compounded this excellent babbitt for the railway field exclusively. It is pure tin, copper, antimony and metallic nickel, alloyed to the highest degree of practical utility—there is not a trace of lead in it. Specify M-J for armature bearing service.

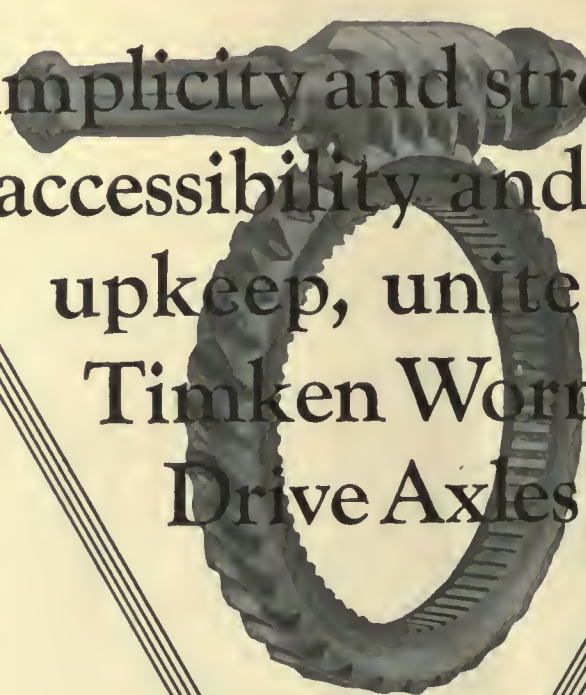
M-J Lubricated and V-K Oilless Trolley Wheels and Non-Arcing Harps.

Perfect lubrication plus maximum conductivity. That's the combination that makes V-K Oilless Trolley Wheels lowest in ultimate cost and higher in net efficiency. It's properly balanced and mechanically perfect in finish. The metal from which it is made is especially tough, yet not too hard. This means greater mileage. The patented oilless graphite and bronze gauze bushing is non-insulating, heat proof, long lived and easily interchangeable.



Let us give you further information and prices on More-Jones Quality Products. Prompt shipments always. Complete cooperation.

TIMKEN



Simplicity and strength,
accessibility and low
upkeep, unite in
Timken Worm-
Drive Axles



THE TIMKEN-DETROIT AXLE COMPANY
DETROIT, MICHIGAN

AXLES

INTERNATIONAL

Fine Coaches in 4 Basic Models

FLEETS of International Motor Coaches in the service of electric railways and independent operators are bringing forth admiring comment from every part of the country. Atlantic City visitors will remember the interest that centered around the beautiful International models exhibited there during the recent convention.

But beauty is not all. International Coaches are structurally sound from basic design out. They are distinctly of coach construction, powered with 6-cylinder coach engines, and designed to combine the refinements that assure fine-car comforts with the stamina required in both truck and coach.

Coaches in these Four Models:

54-L-1	12 to 18 passengers
54-M	18 to 22 passengers
54-H	25 to 30 passengers
54-H-1	25 to 30 passengers

Ample, dependable 6-cylinder power; 4-speed transmission; air brakes on all four wheels; long flexible springs, including auxiliary side springs; low-hung frame; interior refinements unexcelled.

Write for the International Motor Coach catalog

The varied problems of passenger transportation find full solution in the 4 basic models that make up the International Coach line. Chassis, power units, types of drive, and gear ratios are worked out by the International engineers for the individual job. All types are available from the popular pay-enter bus to the de luxe coach of highest quality throughout.

As for real service, it is well to invest in that, too, along with beauty and utility. Consider the value to you of the justly-famous International Service. In the United States we have 105 Company-owned branches, one probably located where your coaches will run.

INTERNATIONAL HARVESTER COMPANY

606 So. Michigan Ave.

of America
(Incorporated)

Chicago, Ill.

Twelve De Luxe International Coaches—the "Florida Blue Line"—will run by way of the great new Gandy Bridge across the bay between Tampa and St. Petersburg. One of them pictured here.



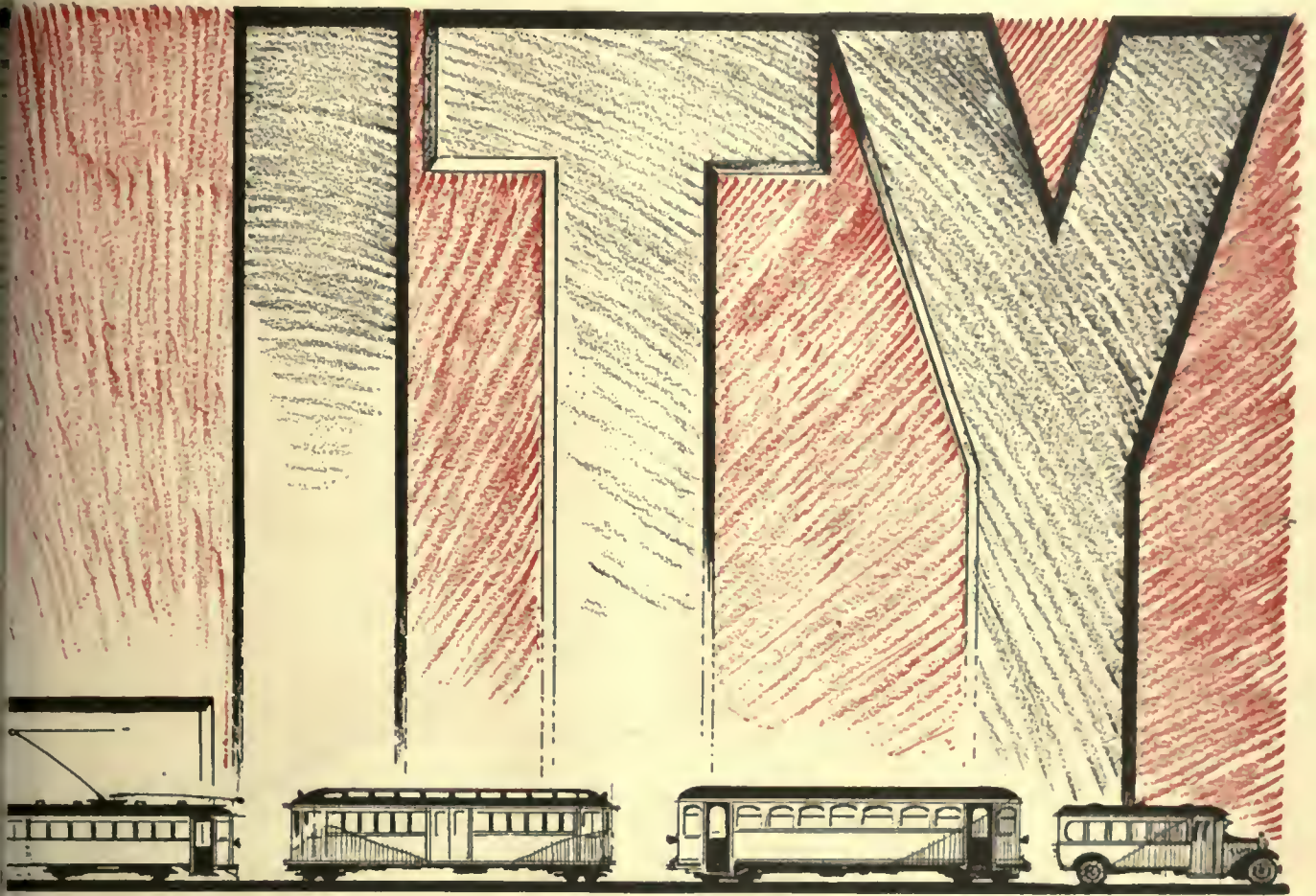


*Ask for Our
Quotations*

Birney Safety Cars
"Universal" Double-Truck
One-Man, Two-Man Cars
Standard City Cars
Interurban Cars — Light,
medium and heavy for
one or two-man opera-
tion.

Trackless Trollicars
Gasoline Rail Cars
Gas-Electric Rail Cars
Trucks
Forgings and Castings
Platform Brakes
Car Seats
Rattan for Repairs
Metal Trimmings
Steel Bus Bodies

St. Louis
Quality
Cars



Backed up by Quality for 36 years

Thirty-six years of constant "quality" building has definitely established the reputation of St. Louis Cars and Equipment, for low maintenance costs.

Our long experience, our engineering data and our manufacturing resources are always at the call of railway operators.

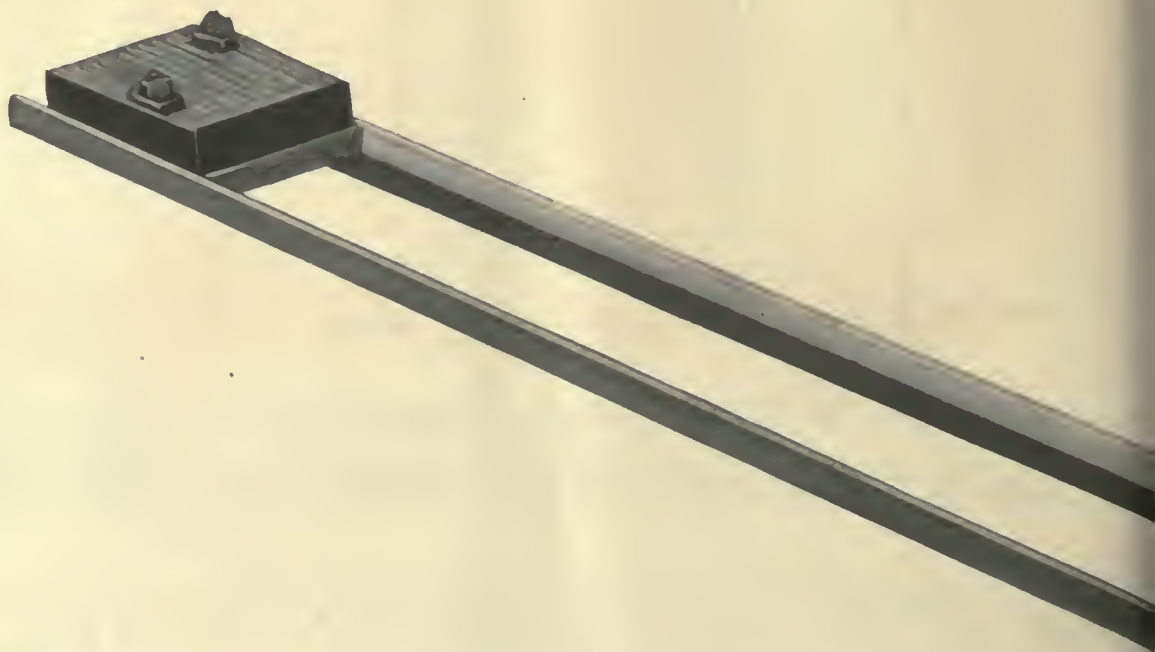
St. Louis Car Company

St. Louis, Mo.

"The Birthplace of the Safety Car"

St. Louis Quality Equipment

When Concrete is Used a Tie Should Do MORE Than Just Support the Rails



A TIE that does no more than just support the rails does not measure up to what a real tie should be.

1st. It should not displace any more concrete than is necessary.

2nd. It should be so constructed that it will protect the concrete, and preserve it against disintegration.

DAYTON

or Track Foundation

The increased weight of trucks over streets necessitates a paving foundation that will withstand this concentrated weight.

The wood tie on ballast necessarily displaces a certain amount of concrete, leaving only a thin coating of concrete above the tie. This coating gives way, and allows water to reach the ballast foundation, which soon buries itself in the subsoil, causing a sinking of the track, and a breaking of the paving.

The Dayton Tie is designed to overcome these weak places, by maintaining a uniform thickness of concrete throughout, besides reinforcing the concrete itself with the steel angles. To secure the maximum service from concrete it should not be permitted to disintegrate under the shocks of traffic. It will go to pieces if nothing is done to absorb the shocks. The tie itself should contain the cushion. This the Dayton Tie does. Resiliency is its fundamental principle.

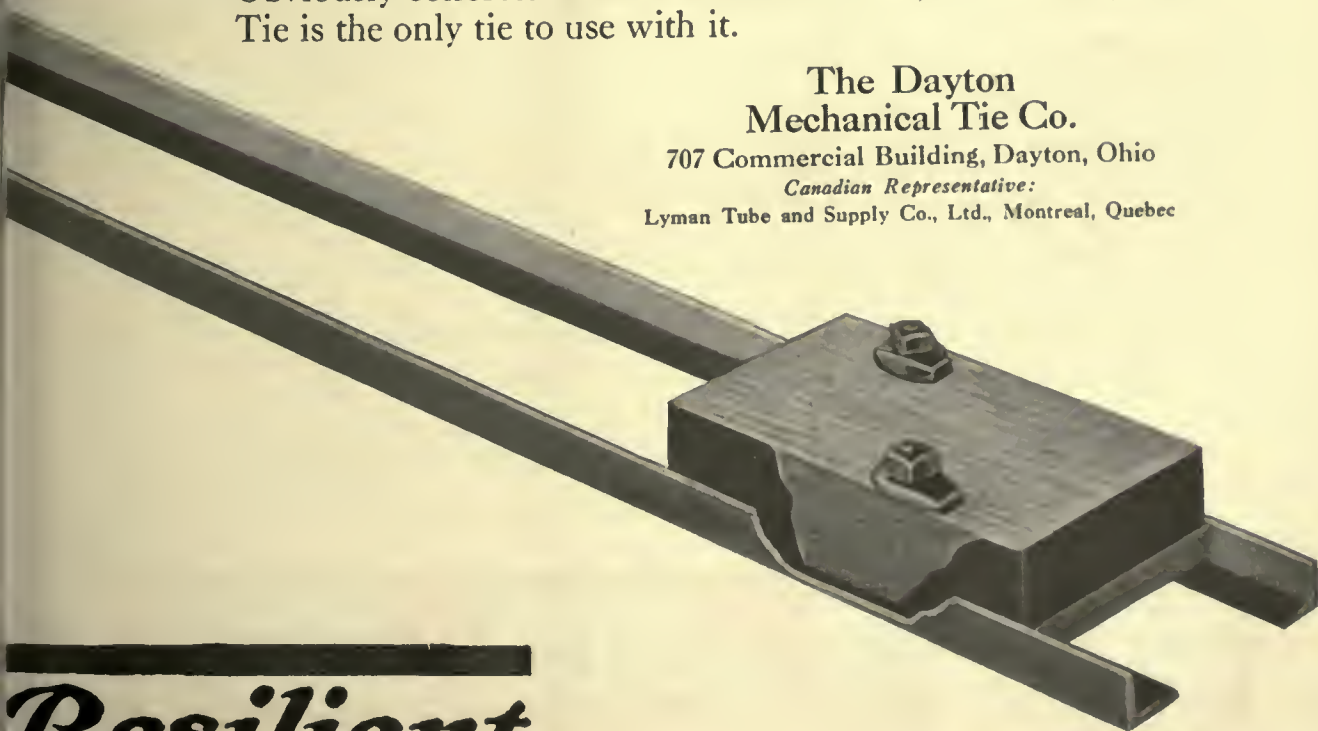
Obviously concrete is the foundation to use, and the Dayton Tie is the only tie to use with it.

The Dayton Mechanical Tie Co.

707 Commercial Building, Dayton, Ohio

Canadian Representative:

Lyman Tube and Supply Co., Ltd., Montreal, Quebec



Resilient TIE

Cushions the Shock
On Rolling Stock

NORTH EAST

Electric Starting Lighting Ignition Horns Speedometers



For Every Type of Bus

Generators Built with the North East dependability that has never been known to quit - specially designed for bus requirements - available in various capacities from 115 to 600 watt output.

Voltage Regulators Permanent adjustment - operate indefinitely without attention - fully compensated to offset temperature changes - positive control of generator voltage under all conditions - prolong battery life by ideal taper charge - rate highest when battery is low, cut to minimum as battery becomes charged - operation just as satisfactory with no battery in circuit.

Starting Motors Built for severe service - heavy type bendix drives - high percentage reserve power to meet cold weather conditions - available with or without internal gear reduction.

Starting Switches and Cut-Outs Ample capacity and durability to meet severest requirements.

Ignition Units Good spark under all conditions - hottest at starting and slow speed operation - entire freedom from contact pitting or burning - easily timed - all parts accessible - available with coil and timer-distributor in same unit or separate, or integral with generator - automatic or manual spark advance.

Horns Powerful compelling tone - instant response - scientific electrical and mechanical design has set a new standard for long life.

Speedometers Accurate - built with same ruggedness as all North East equipment - 100,000 mileage register - large readable figures - highest grade flexible drive shafts.

Catalogue 100-B covers North East Equipment for Motor Buses. Mailed on request.

NORTH EAST ELECTRIC CO.

ROCHESTER



N. Y., U. S. A.

Manufacturers of Equipment for



Yellow Coach
Six Wheeler
Fay & Bowen

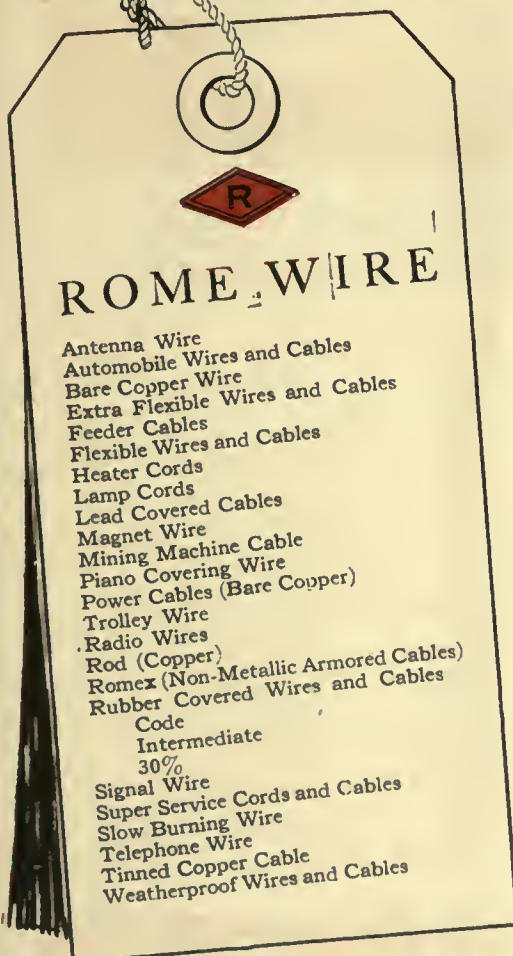
Dodge Brothers
Yellow Cab
Sterling Marine Engine
Acme Road Machine

Reo
Four Wheel Drive
Dodge Watercar
Holt Mfg. Co.

White
Graham Brothers
Berliet
Yellow Sleeve Valve Engine

Fifth Avenue Coach
Delage
Leon Bollee

Your needs supplied promptly



YOUR demands for prompt shipments, Rome can answer.

You'll find Rome Wire uniformly good. Controlled manufacture makes it so.

It is Rome Wire from wire bar to finished wire, with nothing subject to outside influence.

The magnitude of Rome Wire output (from the extensive mills shown above) has made possible the introduction of improved machinery and methods—to assure the manufacture of wire that the user can count on.

Rome Wires are listed in the panel at the left. Data and bulletins sent on request.

ROME WIRE CO., *Mills and Executive Offices* **ROME, N. Y.**
Diamond Mills, BUFFALO, N. Y.

NEW YORK BOSTON CHICAGO CLEVELAND DETROIT
 50 Church St. Little Bldg. 14 E. Jackson Blvd. 1200 W. Ninth St. 25 Parsons St.
 LOS ANGELES, J. G. Pomeroy, 336 Azusa Street

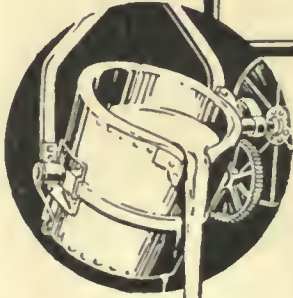
ROME WIRE

WIRE-ROME

Taylor-Wharton Iron & Steel Co.

W. Wharton, Jr. & Co., Inc.

Tioga Steel & Iron Co.
Philadelphia Roll & Mach. Co.



Wharton Trackwork

Showing a $\frac{3}{4}$ Grand Union Lay-out designed for the Toronto Transportation Commission.

Our experience extends over all the stages of street railway development. The application of manganese steel in trackwork originated in this company, and we have developed its use to an unusually high degree of perfection.

TISCO manganese steel, used exclusively in the trackwork manufactured by this company, is treated by the original Taylor-Hadfield process by which, alone, can be obtained that combination of toughness and hardness essential to maximum durability.

Our designs include those adopted by the American Railway Engineering Association as well as our own.

Wm. Wharton, Jr. & Co., Inc.
Easton, Penn.

TISCO

Made Right

Excellence of White Trucks begins with the purchase of materials. Tons upon tons are received every day at the factory, but not a bar or a sheet or a casting is permitted to go into production until it has been thoroughly tested by metallurgists and engineers to be sure that it measures up to the stringent specifications. Nothing is taken for granted.

Accepted material is placed in the hands of skilled, careful workmen with whom White excellence is a sacred tradition. An engineering department of trained and practical men sets the standards to which these men work.

Men, machines and materials are brought together in one great, co-ordinated system for smooth, careful, economical production.

Sold Right

There are rules of business more modern, perhaps, but none more sound than this creed: "Build the best product you can. Add to your cost a fair profit. Your purchaser's satisfaction will be complete and enduring." That policy has always been fundamental with The White Company. White Trucks are not manufactured to a price. They are sold for what it costs to build them, plus a fair profit. There are no trading allowances, no trick discounts, no considerations other than the basic, time-tested principle of sound merchandising—an honest dollar's worth for every dollar accepted from a customer. White prices have never been subject to frequent or wide variation.

The White Company will not knowingly sell you more trucks than you can use economically, or a truck of the wrong capacity for a job. No White sale—whether it is a single truck or a fleet—is complete until the purchaser's satisfaction is complete.

Kept Right

Direct factory branches in all of the principal cities and dealers at other points make certain that every White Truck is kept right.

The White Company has spread the boundaries of its factory yard throughout the world to be sure every White Truck may do its full duty. No White Truck is ever far from skilled and interested care. The needs of the oldest White Trucks can still be cared for should misfortunes of the road stop their wheels.

Making trucks right and selling trucks right has enabled The White Company to build up the organization which is the purchaser's assurance that White Trucks will be kept right.



White Service

Assuring continuous, sustained transportation everywhere.



A White combination tower and line construction truck in the service of the United Electric Railways, Baltimore

White Trucks are built to build business

White Trucks are business builders. Because of their ability to build business for their owners, they have built a great business for their makers. They have done both because they are made right, sold right and kept right.

Repeat orders daily emphasize the satisfaction of White owners. In the service of electric railway, power and light companies there are over 1550 White Trucks in fleets of two or more, exclusive of hundreds of single truck installations.

In addition to the large number of White Trucks owned by electric railways, 37 electric lines operate 783 White Busses in fleets ranging from five to 126. Scores of other White Busses profitably serve electric railways in fleets of less than five.

These owners know truck and bus values. They know their White Trucks and White Busses give the most money-earning miles.

THE WHITE COMPANY
CLEVELAND

WHITE TRUCKS



ARNEGIE STEEL COMPANY
extends to you
cordial greetings
for the New Year
with sincere wishes that the year
Nineteen twenty five
will bring you prosperity
and success



LUMNITE

CEMENT

Speeds Concrete Construction in Cold Weather



Intersection where North Shore Road crosses Revere Street, city of Revere, Mass. The city allowed only 24 hours' closing of the section. On an area of about 1000 yards, using Lumnite Cement, 1: 2: 4 mix, 7" reinforced concrete was laid in November and put in service to heaviest traffic in 24 hours. The other part of the section previously laid, but not with Lumnite Cement, took more than three weeks to cure. Mr. Joseph Tomasello, the contractor, stated that the use of Lumnite not only avoided interruption to traffic, but also permitted completing a job in cold weather impossible with other cement.

SPEEDY elimination of traffic jams and detours, due to street or road construction and repairs, is made possible with Atlas Lumnite Cement all the year around.

LUMNITE is a hydraulic building cement. It produces *twenty-eight-day concrete in twenty-four hours* without the use of artificial accelerators. It is not "quick setting," but allows the normal time for mixing and placing in forms. Its high early strength is obtained through Bauxite, a high-grade aluminum ore, which is its principal ingredient. Within twenty-four hours,

concrete pavement of Lumnite Cement sustains the heaviest traffic.

Also, concrete made with LUMNITE is doubly safeguarded against frost attack, because it hardens in a few hours to a point in its curing beyond danger of freezing, and this rapid hardening, a chemical action, develops very considerable heat within the mass.

LUMNITE is indispensable for repairing city streets and highways where traffic is constantly congested, and for all other concrete work where speed is essential.

THE ATLAS LUMNITE CEMENT CO.

25 Broadway, NEW YORK CITY

2000 First Avenue, Birmingham, Ala.

134 South LaSalle Street, Chicago



SEND THIS COUPON TODAY

Please send your booklet on Lumnite, also detailed information on Lumnite's use for _____

Name _____

Address _____

J.E.R.V.



Stop!



Nachod Says: "Wait at this Siding"

No danger of a car running past a siding and meeting another when your line is equipped with NACHOD Automatic Signals. The "long arm of warning" reaches out and holds one at the siding while the other runs the single track.

The Nachod Signal never forgets, never sleeps, never relaxes its vigilance. N-A-C-H-O-D "spells safety" to the entire system.

No other current is needed except that already in your trolley system. There is nothing about Nachod Signals to get out of order to interfere with the reliability of their service. They are easy to install and maintain. No tearing up of track or rebonding—no insulated joints. Brilliant day and night signals—separate and independent.

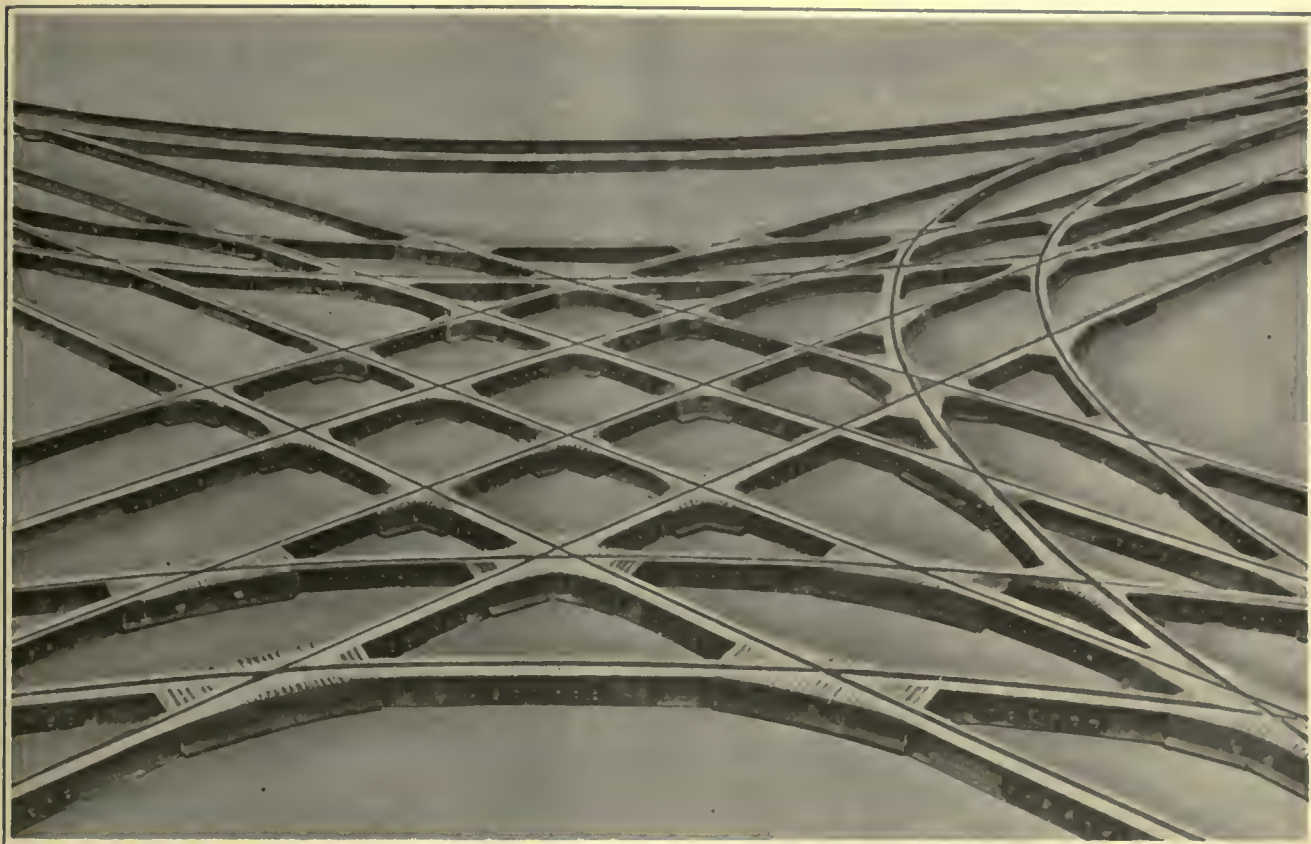
Over 125 electric railways in America and foreign countries use Nachod Signals.

Our Catalog No. 719 gives complete information on block signals. Also manufacturers of Highway Crossing Signals, Headway Recorders, Flasher Relays for trolley lines.

Write for it.

Nachod Signal Co., Inc.
Louisville, Kentucky

NACHOD

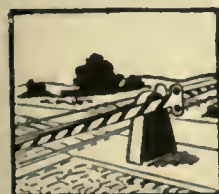


Typical Manganese Center Special Track Work

Unusual in Quality and Performance BUDA



Bus Engines

Track and
Bonding Drill

Crossing Gates

Track work for every condition of service, in standard layouts or complicated special work, when it bears the Buda mark, can be relied upon to render entire satisfaction. In many American Cities are examples of Buda track work that are demonstrating the long life characteristics built into every Buda product.

The high standard of Buda tools and accessories and Buda engines for motor buses and trucks is the result of 43 years of experience. Write Buda for literature on every phase of track construction and maintenance.



THE BUDA COMPANY
Harvey (Chicago Suburb) Illinois



Track Jack



Railroad Crossing



Hand-Car

TRADE

ANDERSON

MARK

Partial List of Anderson Material for Electric Railways

Insulated Bolts
Feeder Plugs
Boston Suspensions
 " Straight Line
 " Single Curve
 " Double Curve
 " Bracket Arm
 " Straight Line Twin
 " Single Curve Twin
 " Double Curve Twin
 " Strain Twin
Round Top Straight Line Suspensions
 Single Curve
 Double Curve
 Bracket Arm
Cap and Cone Suspensions
 " " Straight Line
 " " Single Curve
 " " Double Curve
 " " Barn
 " " Bracket Arm
 " " Twin Straight Line
 " " Twin Single Curve
 " " Twin Double Curve
Suspension Types A,B,C,E,F,G,H,I,J,K
Insulators
 Globe Strain
 Elephant Globe Strain
 Giant Strain
 Wood Strain
 Porcelain
 Split Spool
 Feeder Wire
 Section Beam
 Double Section Beam
Double Take-Up Turnbuckles
Turnbuckles
Frogs
 Any degree
 2-4-6 Pull Off Rings
 Pivot Type
 Removable Ears
 Draw Bridge
 Wearing Plates
Ears
 Double Strain
 Half Strain
 Feeder
 Clamp
 Clamp Feeder
 Curve Clamp
 Double Strain Clamp
 Half Strain Clamp
 Solder Ears
 Feeder Solder Ears
 Double Strain Solder Ears
 Straight Line Clip Ears
 Double Strain Clip Ears
 Feeder Clip Ears
 Curve Clip
 Double Center Straight Line
 Mechanical Ears
Strain Plates
Overhead Conductor
 Bar Construction
Terminal Clamps
Shackles
Bell Suspensions
Come-along Clamps
Soldering Irons
Trolley Wire Stretchers
Cap and Cone Tongs
Section Switches
Disconnecting Line Switches
Time Switches
Testing Clamps
Lindall Brush Holders
Harps
Sleeve Cutters and Wheels All Kinds
Quick Break Switches
Crossings
 Any degree
 Insulated
 Uninsulated
 Adjustable
 Removable Ears
Yokes
 Straight Line
 Single Curve
 Double Curve
Splicing Sleeves
Tubular Wedge
Splicing Ears
Cable Splicers
Wheels

Making Line Material for over thirty years

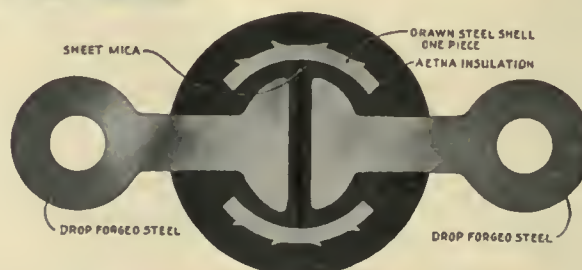
When electric railways were in their infancy Anderson designed and made the overhead material that was used.

As conditions demanded, Anderson designed new and additional line material to meet the growing needs of the industry.

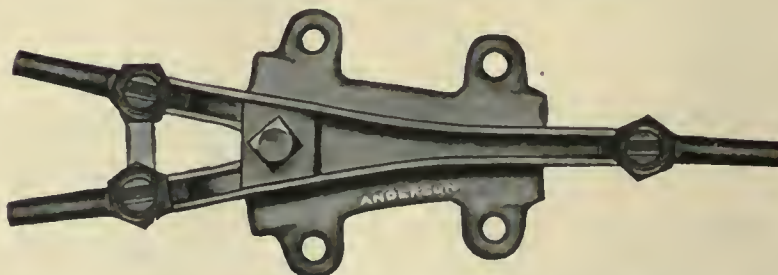
Modernizing your equipment means the installation of well-tried, honest, reliable material that you know will facilitate service, cut out delays, and reduce maintenance costs.

Look over this list—send in your requirements and we will be glad to give you the latest quotations on modernized line material with over thirty years of experience behind it.

We are especially well equipped to design and manufacture overhead material to meet the specific needs of local conditions.



Cross-section of Elephant Strain Insulator



Frogs of Malleable Iron or Bronze in Any Degree

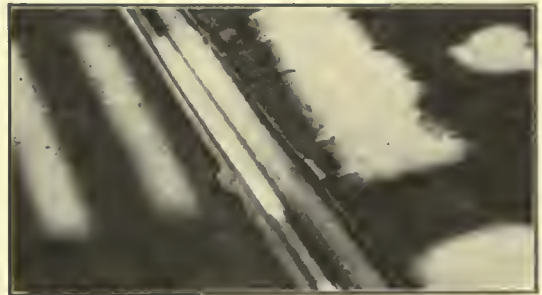
Albert & J. M. Anderson Mfg. Co., 289-305 A St., Boston, Mass.

New York—135 Broadway Philadelphia—429 Real Estate Trust Bldg. Chicago—105 S. Dearborn St. London, E. C. 2, 12 Moor Lane

Manufacturers of Line Material, Insulators, Circuit Breakers, Heavy Knife Switches, Automatic Time Switches, Charging Plugs and Receptacles.

More Railway Properties Used The Thermit Rail Weld In 1924 Than In Any Previous Year

Our list of satisfied customers has always shown a constant and increasing growth but in 1924 the increase broke all records. Our old customers keep on using the process because they know from experience that it is unquestionably the best and most economical way to eliminate rail joints with their cost of maintenance. Other roads take it up because they desire to profit by the experience of those who are best qualified to know. They have been particularly impressed by the fact that the first Thermit Insert Rail Welds made over 12 years ago are still as good as ever. These welded joints have not cupped or pounded and practically none have broken. We feel safe in claiming that no other method of welding rails can show such a record involving such a large number of welds over such a long period of time and under such heavy traffic.



One of many Thermit Rail Welds which has been in place under heavy traffic on Third Avenue, New York City, for over eleven years.



A Thermit Rail Weld made over five years ago in Grand Street, Jersey City, N. J., and still as good as new.

If in 1925 you desire to secure the most from your construction and maintenance appropriation, you will plan to use the Thermit Weld. It assures economy, permanence, and flexibility. The equipment is low in first cost and is useful for many purposes besides welding rail joints. We shall be glad to demonstrate this to your satisfaction, and to quote you on your contemplated track work for 1925.

Metal & Thermit Corporation

120 Broadway, New York

Pittsburgh

Chicago

Boston

S. San Francisco

Toronto



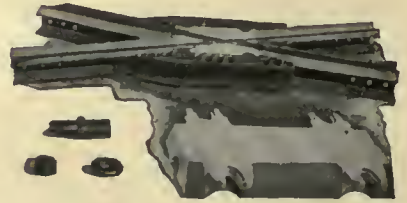
Bethlehem Specialties

TRACKWORK AND ACCESSORIES



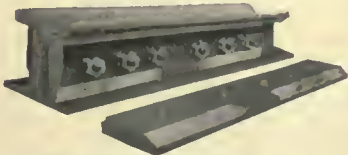
Rolled Steel Alloy Crossing, Design 960

This rolled steel crossing is made of a special rolled Mayari chrome-nickel steel rail. The head of the rail is rolled full, the flangeway machined to any desired depth and then heat-treated to withstand wear. The rails are iron-bound into one solid piece, flange bearing throughout. This crossing may be welded after wear has developed.



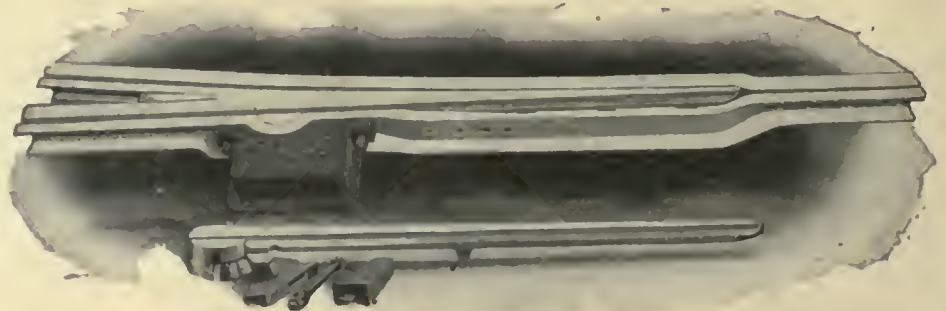
Hard Center Frog, Iron Bound Type, Design 942

Hard Center Frog, Design 942 is provided with a heavy wearing plate three inches thick, held firmly to the carefully machined bed of the frog body by heavy stud bolts of heat treated Mayari chrome nickel steel. The entire construction is unusually heavy and substantial.



Machine Fitted Joint, Design 983

Joint illustrated above is accurately machined top and bottom to fit any rail section. The special bevel top and bottom is provided for electric arc welding.



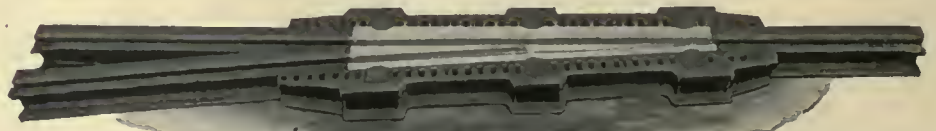
Solid Manganese Tongue Switch, Design 905

This switch is of the improved "Big Pin" type, providing maximum bearing surface or support at the heel. The positive action of hold-down block resists any tendency of the tongue to rock under side thrust, or kick up at the point due to the pounding action of car wheels. The extra large box at the heel of the tongue provides ample room for easy adjustment and quick cleaning.



Center Rib Base Plate

This design provides the maximum stiffening reinforcement directly under the rail joint. It supports the joint and prevents battering or cupping of the rail ends.



Hard Center Mate, Iron Bound Type, Design 923

Hard Center Mate, Design 923, is of the same construction as the frog illustrated above. These designs have the combined advantage of a wearing plate of manganese steel with rolled arms to which either standard rolled or welded joints can be applied.



Abbot Base Plate

The Abbot Base Plate serves the same purpose as the Center Rib. In this case the reinforcement is on each side instead of in the center.

BETHLEHEM STEEL COMPANY, General Offices: BETHLEHEM, PA.

New York Buffalo Boston Cleveland Philadelphia Detroit Baltimore Cincinnati Washington Chicago St. Louis Atlanta San Francisco Pittsburgh

Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products

BETHLEHEM

for Electric Railways

ROLLED STEEL CAR WHEELS AND AXLES



Cambria Car Wheels are made by a combination rolling and forging process which thoroughly works the steel and gives exceptional refinement in structure. Cambria Car Wheels will give you the longest service at the lowest cost.

Cambria Axles for Street, Interurban, Subway and Elevated Cars, and Armature Shafts for electric service are furnished rough turned all over to meet any reasonable specification heat treated, annealed, or untreated.

Bethlehem Products for the Electric Railway Field include rails, spikes, trackwork, splice bars, bolts, tie plates, tie rods, pole line material, sheets, gear blanks, axles and rolled steel car wheels.

BETHLEHEM STEEL COMPANY, *General Offices:* BETHLEHEM, PA.

Sales Offices:
 New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh
 Buffalo Cleveland Detroit Cincinnati Chicago St. Louis San Francisco
 Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products

BETHLEHEM

50,000 Tons NEW RAILS

First Quality
Hunts Inspected

80°-85°-90° ASCE and
other sections complete
with accessories.



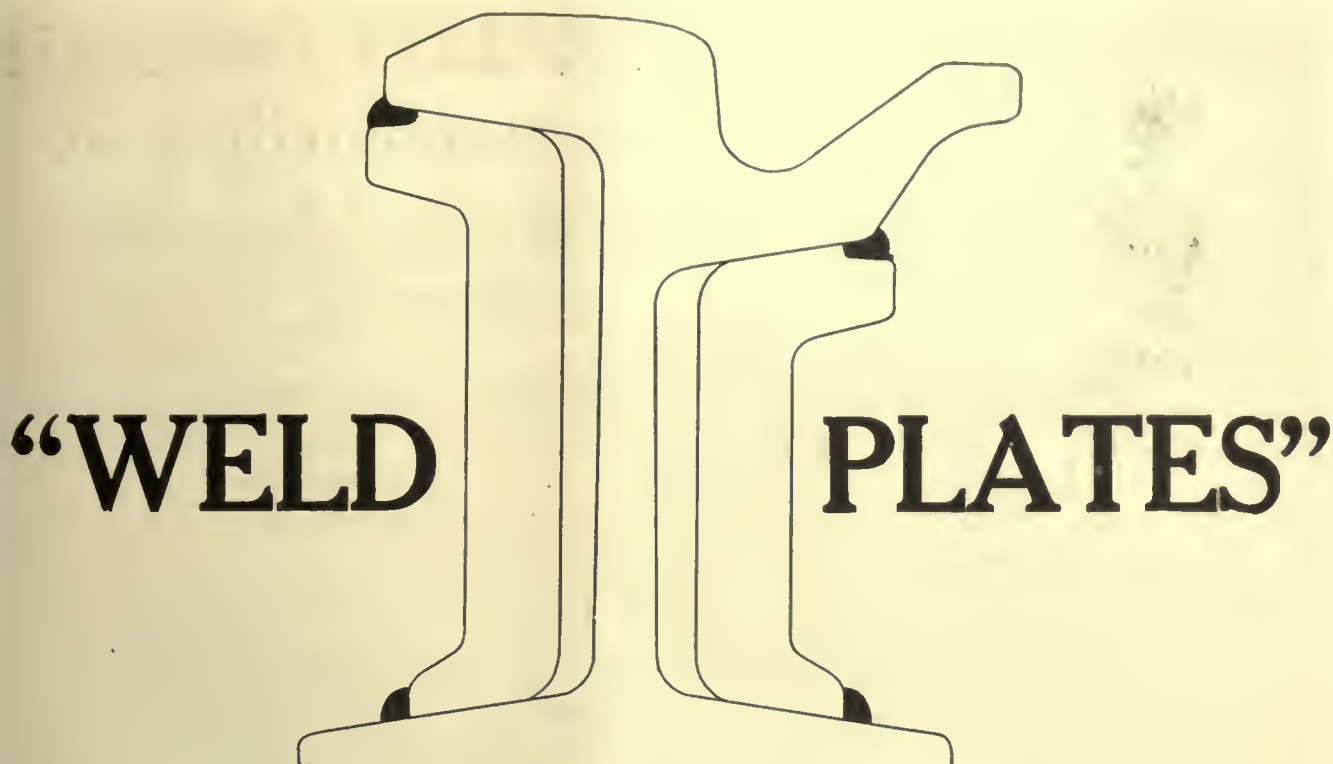
Real
Savings
for Buyers

Immediate Delivery
From Stock

1 ton or 1000

PHONE, WIRE OR WRITE FOR PRICES





Modernize your welding practice!

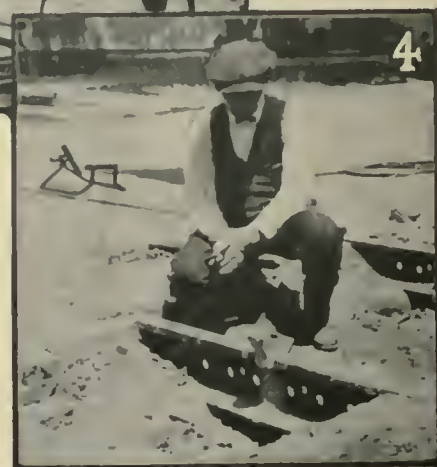
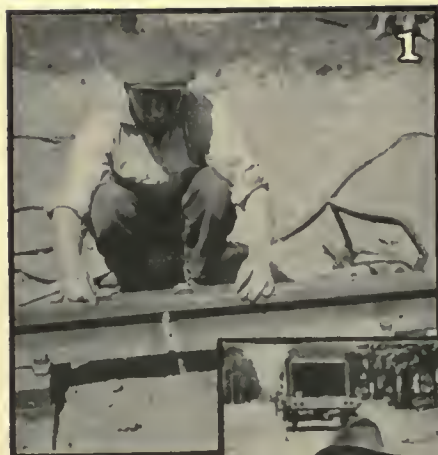
All you need is a trial to show that our patented "WELD PLATES" make the most efficient and economical of bar-weld joints.

Because they are the strongest and most up-to-date plates rolled especially for electric welded joints. Note the shape—the grooves for retaining plenty of weld metal along the upper edges—the wide contact areas at top and bottom,—the suitability for the use of short bolts.

Many of them in successful use.

The Rail Joint Company
61 Broadway, New York, N. Y.





The FERALITE Process is making alumino thermic welding practical and popular

Key to the illustrations:

1. Aligning rail preparatory to welding—showing "undercut."
2. Next step—placing the moulds.
3. Preheating two joints simultaneously with our preheater.
4. Solid FERALITE joint after removing moulds.

THIS efficient process has met with an enthusiastic welcome from railway men all over the country for several important reasons.

First—We offer a simplified, rapid, and eminently satisfactory process. Everyone admits the superiority of alumino thermic welds which eliminate the joint entirely. Now the FERALITE process makes them practical.

Second—Our engineers are practical railway men, who know rail welding from A to Z.

Third—Our organization being young and vigorous is bent on giving every job the very best individual attention. We simply *have* to make each job another success, to add to the scores already achieved.

Fourth—We are making quotations today on alumino thermic welded joints which make them most attractive on any basis of comparison.

The FERALITE process requires no inserts. An absolutely homogeneous weld is secured by butting the rail heads, and this process, by fusing them together affords a solid weld

of the original metal. Correct alignment is insured by this means, and grinding is practically eliminated.

With the FERALITE process is included all the necessary equipment and materials—preheaters, moulds, crucibles, welding portions, etc. Important improvements in all these items is one factor which has lowered the cost of alumino thermic welding by the FERALITE Process.

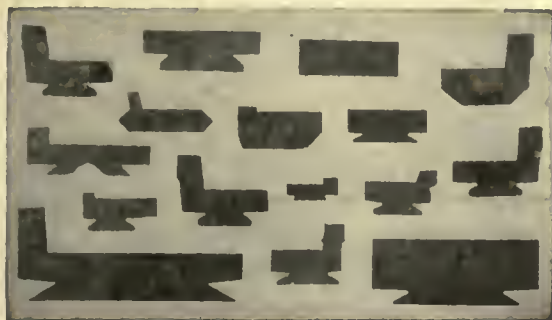
Get our figures for your 1925 welding program before you make your final plans.



ALUMINO-THERMIC CORPORATION
ROSELLE PARK, N. J.



Good Motor Insulations



Micanite Commutator Segments



Empire Oiled Cloth



Micanite Commutator Rings



Armatite for Slots—2 Insulations in 1

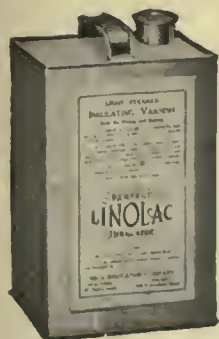
Lasting insulations —always uniform in quality

How long is the life of a motor? Isn't it usually as long as the life of the insulation?

Insulation that lasts is insulation that keeps motors on the job—insulation that pays. Micanite and Empire Products are just such insulating materials—and have been constantly so for over thirty years.

There are 57 standard Micanite and Empire Products. All lasting insulations. All uniform in quality. We'll gladly send you pieces for test.

Write for a copy of "Commutator Insulation and Assembly", an interesting and instructive booklet which we believe you will find of everyday, practical value.



MICA INSULATOR CO.

Main Office: 68 Church St., New York
Works: Schenectady, N. Y.

Chicago Office: 542 South Dearborn St.
Canadian Office: Victoriaville

Turning to—

business.

New York Railways Awards Oil Contract

An important electric railway lubricating contract was closed Nov. 8 when the business of supplying oil for the entire lubricating requirements of the New York Railways was awarded to the Texas Company.

The New York Railways operates 1,593 motor passenger cars over 72.43 miles of route in Greater New York. The contract with the Texas Company does not include oil for use in power stations as the railway purchases its energy from the Interborough Rapid Transit Company. The contract became effective on Nov. 1.

Clipping from Electric Railway Journal, Nov. 15, 1924.

Brooklyn-Manhattan Transit!

Every car, from one man safety to ten car subway train of the vast B-M-T is now Texaco lubricated.

Boston Elevated Railway Company, too!

Here's a system operating thousands of surface cars, elevated lines and rapid transit subway service—Texaco Lubricated also.

New York Railways the latest!

The year 1924 has seen a number of the transportation companies turning to Texaco. There must be a *real reason*, when Texaco takes on the lubrication of the New York Railways.



THE TEXAS COMPANY, U. S. A.
Texaco Petroleum Products

TEXACO

ELECTRIC STREET RAILWAY LUBRICATION

MOTOR OIL GASOLINE

Because it's logical!

Consider the fact that the Texas Company is a leading refiner of petroleum products for every purpose. Its immense size, complete organization and efficient technical departments, enable it to furnish exactly the right grades and qualities of lubricants or

motor fuel for every service. Furthermore, producing on a world-wide quantity basis, The Texas Company is able to offer quotations on a most attractive price basis. Isn't it reasonable to find more and more electric railway companies and bus operators turning to Texaco?

—and the buses of Pennsylvania-Ohio System

In the field of automotive transportation, Texaco products have a long-established supremacy. The use of Texaco Gasoline and oils on the Penn-Ohio System is only one of many conspicuous examples.



17 Battery Place, New York, N. Y.

Offices in principal cities



Car of Pittsburgh Railways Company, Pittsburgh, Pa., painted with aluminum paint

A shining example of— **ALUMINUM** in the electric railway field

ALUMINUM PAINT

The car can be seen "a mile away," with its coat of weather proof, corrosion-preventing aluminum paint. The surface is easier to keep clean. Aluminum paint is also used on line equipment, outdoor appliances, and wherever protection and durability are needed.

ALUMINUM CONDUIT AND CAR PARTS

Rigid aluminum conduit weighs only about one-third as much as ordinary metal conduit. Rust and corrosion proof. Easier to install. Aluminum is also used for special fittings such as stanchions, lamp sockets, etc.

Write for booklet

ALUMINUM CABLE

For transmission lines and railway feeders. Lighter weight permits longer spans with resultant saving in construction costs and maintenance.

ALUMINUM COMPANY of AMERICA
Oliver Building, Pittsburgh, Pa.

Makers of Aluminum in Every Commercial Form

Did you see this Armature at the AERA Convention?



Armature was never taken out of original case until sent to the A.E.R.A. Convention.

In continuous service four years and three months.

Mileage 206,170. Bearing Wear .0024 inch.

This armature was taken at random from a number of cars—not a picked armature.

This performance speaks for itself, and shows what can be done with

TULC LUBRICATION



You know the cost of rewinding armatures—the cost and replacement of bearings.

THE UNIVERSAL LUBRICATING CO

Schofield Building, CLEVELAND, OHIO

Jameson-Ross Co., Straus Building, Chicago



Forward—
to higher standards of electrical maintenance! ●

THIS is one place where every dollar spent returns in ten-fold savings. The quality of insulating materials, their dielectric strength and freedom from imperfections, influences directly the length of time your repair job will last.

Judge then of the possibilities of savings by the use of Irvington Insulating Materials. As one specific example, consider Irvington Black Varnished Cambric. It has 30% higher dielectric strength; 100% better heat resistance; 100% more alkali and acid resistance; 200% better aging qualities; 200% more resistance to oil than ordinary yellow varnished cambric.

All Irvington Products possess similar quality superiority.

IRVINGTON Products

Varnished Paper
Black and Yellow Varnished
Cambric
Black and Yellow Varnished
Silk
Irvington "Seamless Bias"
Varnished Cambric Tapes
Flexible Varnished Tubing
"Cellulak"
Irvington Insulating Varnishes
"Irv-O-Slot" Armature
Insulation
The World's Standard

IRVINGTON VARNISH & INSULATOR CO. Irvington, New Jersey.

Established 1905

Sales Representatives:

Mitchell-Rand Mfg. Co., New York
T. C. White Electrical Supply Co., St. Louis
E. M. Wolcott, Rochester

Prehler Bros., Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles
F. G. Scofield, Toronto

Seven factors of Quality

High Dielectric Strength
High Resistance
Flexibility

Non Hygroscopic
Heat Resisting
Chemically Neutral

Maximum Elasticity



Clean Oil for Waukegan

The De Laval Oil Purifier shown below at the left helps insure continuity of service for the first turbo-generator installed at the new Waukegan Station of the Public Service Company, of Northern Illinois.

With this machine, the dirt, sludge and water with which the oil returned from the bearings is contaminated are instantaneously centrifuged out by the Purifiers, the purified oil being returned to the system with its original lubricating efficiency restored. Thus, there is no chance for emulsions to form or for sludge to settle out in the oil reservoirs or in the piping. Consequently, there can be no stoppage of the flow of clean oil to the bearings.

The much higher efficiency obtained by De Laval centrifugal purification is fully established among builders and operators of the most modern power plants—large and small alike. This has resulted in the use of these machines by four of the five largest utility companies in America and hundreds of smaller ones.

Let our engineering department co-operate with you in designing a better system of oil purification for your plant. We have interesting proof of the savings in oil and labor that can be made. Write us today for Bulletin No. 105.

The De Laval Separator Company

New York, 165 Broadway Chicago, 29 East Madison Street
DE LAVAL PACIFIC COMPANY
San Francisco

Please send Bulletin containing further information regarding the De Laval Oil Purifier as checked below:

- ☐ Purification of turbine lubricating oil.
- ☐ Purification of Diesel lubricating and fuel oil.
- ☐ Dehydration of transformer oil.
- ☐ Reclamation of car axle oil.

Name
Company KRJ-447L
Address



No. 208
"DELUXE"



No. 108
"DELUXE"



Develop Satisfied

DEVELOPING a satisfied consciousness is the best way of creating favorable public opinion and increasing the car riding habit.

Hale & Kilburn Seats because of their pleasing appearance and rare comfort have done much to develop a satisfied riding public.

Passengers appreciate comfortable well-upholstered seats. They speak well of the cars that are comfortable to ride in.

**Hale and
Kilburn SEATS**



a Consciousness

There is a Hale & Kilburn Seat in a style suitable for city cars—safety cars—interurban and motor buses. They will do much to build up good will, by developing a satisfied consciousness.

No. 208 DeLuxe Bus Seat. Last word in comfort and elegance. "Like riding in a private car."

No. 108 DeLuxe Bus Seat. Deep soft springs. Unusually fine for general service.

No. 300A. Standard Rattan Walkover street car seat.

No. 300 A. E. Elegant Interurban Walkover steel seat.

There are others. Send for Catalogue.



No. 300 A
Standard
Rattan
Walkover
Steel Seat



No. 300 A.E.
Standard
Interurban
Steel Seat

Hale-Kilburn Co. Sales Offices:

Hale-Kilburn Company,
30 Church St., New York

Hale-Kilburn Company,
1530-33 McCormick Bldg.,
Chicago, Ill.

E. A. Thornwell,
1513 Candler Bldg., Atlanta, Ga.

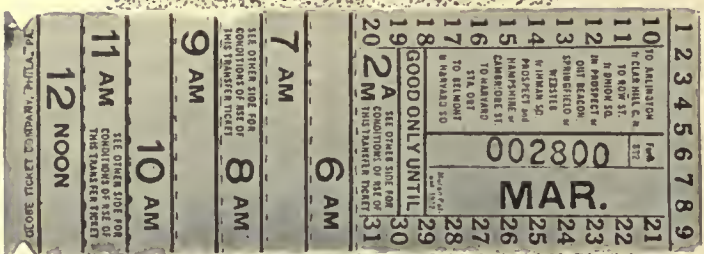
Equipment-Sales Corp'n,
Railway Exch. Bldg.,
St. Louis, Mo.

Frank F. Bodler,
903 Monadnock Bldg.,
San Francisco, Calif.

Chris Eccles,
320 S. Sao Pedro St.,
Los Angeles, Cal.

Harry M. Euler Company,
46 Front St., Portland, Ore.

T. C. Coleman & Son,
Starke Bldg., Louisville, Ky.



STOP

In
1925

Stop transfer abuses with
the Moran Patent Transfer

The latest improvement in transfer design, this Moran Patent Transfer *fixes* the time limit beyond dispute. Its validity is instantly apparent to the conductor — time-expired transfers are instantly detected. A.M. and P.M. indicated by contrasting colors, time limit controlled by tearing off the perforated coupons — conductors can issue this transfer with greatest rapidity.

Let us put you in touch with roads which have adopted the Moran Patent Transfer.

GLOBE

Tickets—Transfers—Passes

As specialists in this class of work, we can offer expert assistance and service in the designing of suitable tickets to meet the requirements of any special case.

Our extensive facilities and large production enable us to produce at lowest cost.

GLOBE TICKET COMPANY
116 N. 12th Street, Philadelphia, Pa.
Los Angeles New York San Francisco





Tune in on Station CCH

This is station CCH, the Consolidated Car Heating Company, broadcasting a short program to the electric railway industry, direct from its factory at Albany.

Modernized Door Engine Equipment—

RAILWAYS throughout the country who are equipping their cars with Consolidated Door Engines are getting the latest type construction in which are embodied many important safety features. Consolidated Door Engines are known for their smooth, safe and efficient operation. The cylinders are ground and polished to give longest life to piston leathers.

Doors operated by Consolidated Equipment are accident-proof. The passenger is protected in three ways—a soft, yielding cushion shoe on the door; a buffer spring in the door operating arm, and finally a by-pass in the door engine itself so that pressure cannot build up in the closing cylinder. The slightest bodily contact gently stops and holds the door.

When considering complete door operating equipment, think of Consolidated and weigh the many built-in points of advantage. Consolidated engineers are at your service.

Station CCH now signing off until next week, when it will resume broadcasting with another weekly message.

Good day!

CONSOLIDATED DOOR ENGINES



CONSOLIDATED CAR HEATING COMPANY
ALBANY, N. Y.

FARE MODERNIZATION



*This Device Embodies
These Essentials:*

**Labor-Saving Efficiency
Attractive to the Public**

Approved:—By the Brooklyn City Railroad after one years' test on 200 cars as standard equipment on the 335 new cars, making a total of 600 of these electric coin switches on this company's operation.

The use of this latest fare collecting device has proven during this period of service that platform work is easier and better done—the time stop, passengers boarding and alighting is decreased, making for faster schedules—Automatic, instantaneous, audible and visible registration by the coin itself means maximum passenger revenue, and the uninterrupted flow of the passengers boarding cars attracts and pleases the public.

All of which promotes our soliciting your interest in the adaptation of this device to your own fare situation.

*Almost indispensable for one-man car operation
For full particulars write*

JOHNSON FARE BOX CO.

4619 Ravenswood Ave.
Chicago, Ill.



366 Madison Ave.
New York, N. Y.

Investigate!

The Ultimate Track Jack

YOU know the track jacks you are now using —their good points and their limitations. You know that rails and tracks have steadily been getting heavier, but in spite of this tendency you have hesitated to change an old standard tool for a new untried tool. Yet you clearly recognize the need for a new standard track jack of greater capacity and easier operation, made expressly to keep pace with the increasing weight of rail and track material.

Now, since the perfection of the new Barrett track jacks No. 1-A and 110, the problem has been solved in the most successful manner. After six month's practical service test on one railroad, the officials pronounce them "by far the most satisfactory track jacks we have ever used." No railroad man who has yet thoroughly examined and tested these jacks, has hesitated to say they are the best he has ever used. Their great capacity, their easy operation, their particularly easy tripping, their simple automatic lowering device, their non-breakable trip, and other special new features, all combine to set these jacks apart as "the track jacks you will ultimately use."

Write us now for free test and full particulars

THE DUFF MANUFACTURING CO.

Established 1883 • PITTSBURGH, PA.

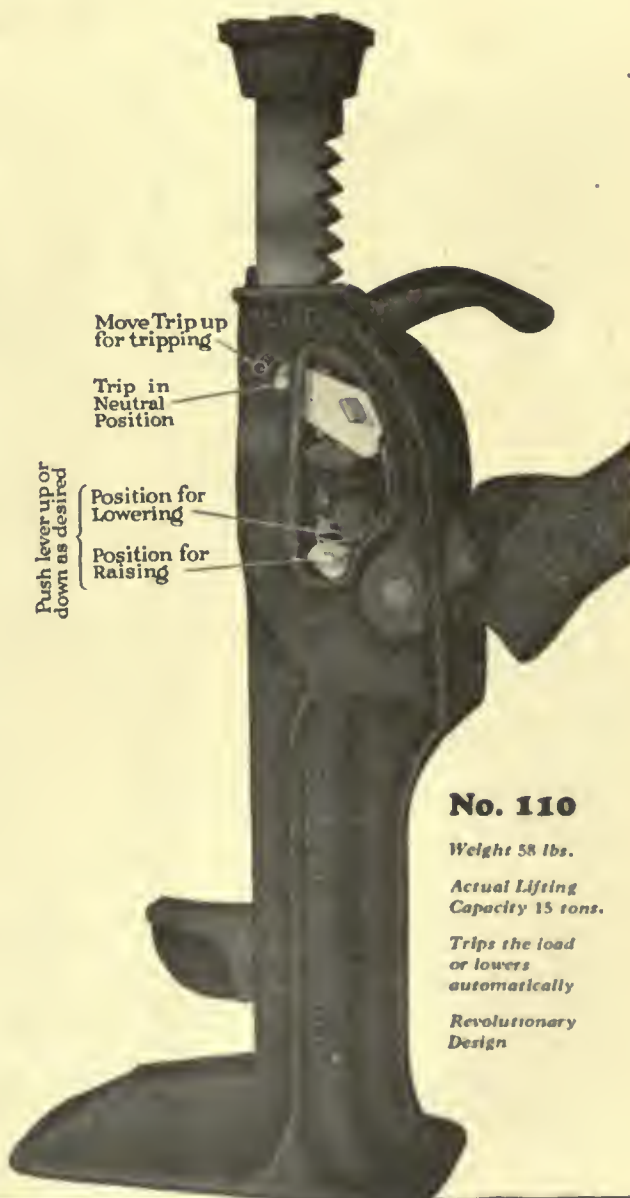
New York
Atlanta

Chicago
St. Louis

Houston
San Francisco

*Genuine
Barrett*

*Ask for FREE Demonstration
without obligation on your part*



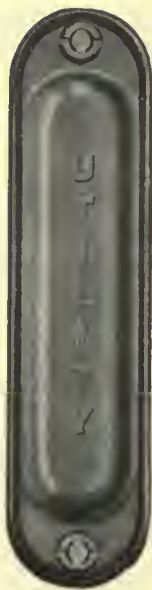
No. 110

Weight 58 lbs.

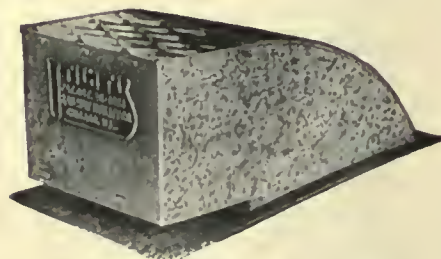
*Actual Lifting
Capacity 15 tons.*

*Trips the load
or lowers
automatically*

*Revolutionary
Design*



Utility New Type Heat Regulator No. 8. No relay. Greater uniformity of temperature, greater comfort, with 50% saving in current are assured by its use.



Utility Honeycomb Ventilators are constructed on the most scientific principle. Not only is the ventilation superior with this type of equipment, but a great saving of current for heating is also effected.



Left—Vestibule type Utility Heater. Below—Truss plank type Utility Heater. The "Chromalox" heating element of these heaters is constructed throughout of materials that resist deterioration from alternate heating and cooling. They meet every requirement of the Underwriters' Laboratories, whose approval they bear.



Riding Comfort Attracts Patronage

*Warmth With Fresh Air Is
Easily Obtained the UTILITY Way*

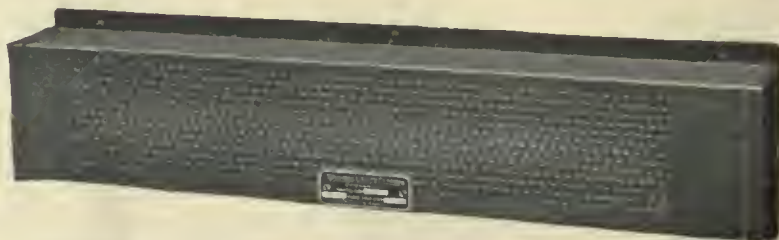
The latest development in car heating is the new Utility Electric Car Heater with "Chromalox" elements. These elements are so constructed as to defy injury from overloads, vibration, dust, dirt or moisture. They can safely be operated at 1400 degrees without the slightest danger. The strip heaters are so mounted as to allow perfect circulation of air and every bit of current is applied to useful work and all types of Utility Heaters can be installed on combustible portions of the car body as they leave the factory without additional insulating materials of any kind. Perfect protection is provided in the heater itself so that additional shields are not required to prevent injury to clothing or seats.

*Uniform Car temperature and adequate ventilation
always result from using Utility Products.*

Railway Utility Company
141-151 West 22nd Street, Chicago, Illinois



Individual Chromalox Strip Heater, the "active" part of Utility Heaters.



Kalamazoo

trolley wheels and harps

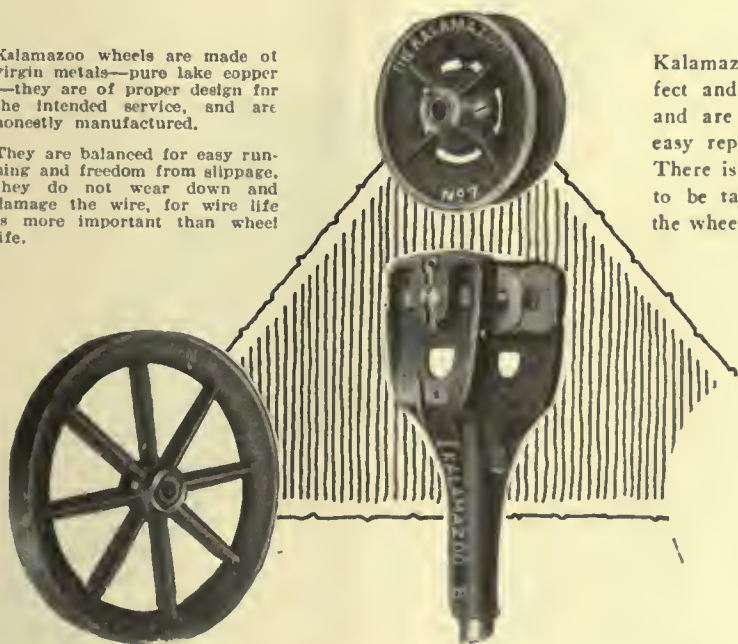
Over twenty-five years in the making of trolley wheels and harps in a shop devoted exclusively to these specialties has brought about a close association with the railway field—resulting in a perfect understanding of operating conditions and the direct result of proper APPLICATION on proper OPERATION.

The high quality of Kalamazoo products is endorsed by the leading electric roads. In building up this good will we have concentrated on "quality" and "service"—to hold the good will we will continue this policy.

Kalamazoo wheels are made of virgin metals—pure lake copper—they are of proper design for the intended service, and are honestly manufactured.

They are balanced for easy running and freedom from slippage, they do not wear down and damage the wire, for wire life is more important than wheel life.

Kalamazoo Harps give perfect and continuous contact, and are designed to permit easy replacement of wheels. There is only one cotter pin to be taken out to remove the wheel.



STAR BRASS WORKS

Kalamazoo, Michigan

The largest exclusive manufacturers of trolley wheels in the world



Sure, it'll be

What is Boyerizing?

Boyerizing does to car parts and brakes rigging what other processes attempted to do and failed. It gives a glossy, glass-hard armor coating to the metal which literally offers no foothold for wear.

And in cold, hard figures it means that Boyerized parts outlast ordinary steel parts not once or twice but three to four times.

If you don't believe us get a few Boyerized Brake Pins, for instance, and try them out.



The McArthur Turnbuckles

Requires only a small hand wrench to get a grip that "stays put." One full tooth exposed at the end on each section acts as a cutter in removing ice or caked mud.



a good year for railways

Just look at this list of
“stars in the ascendency”

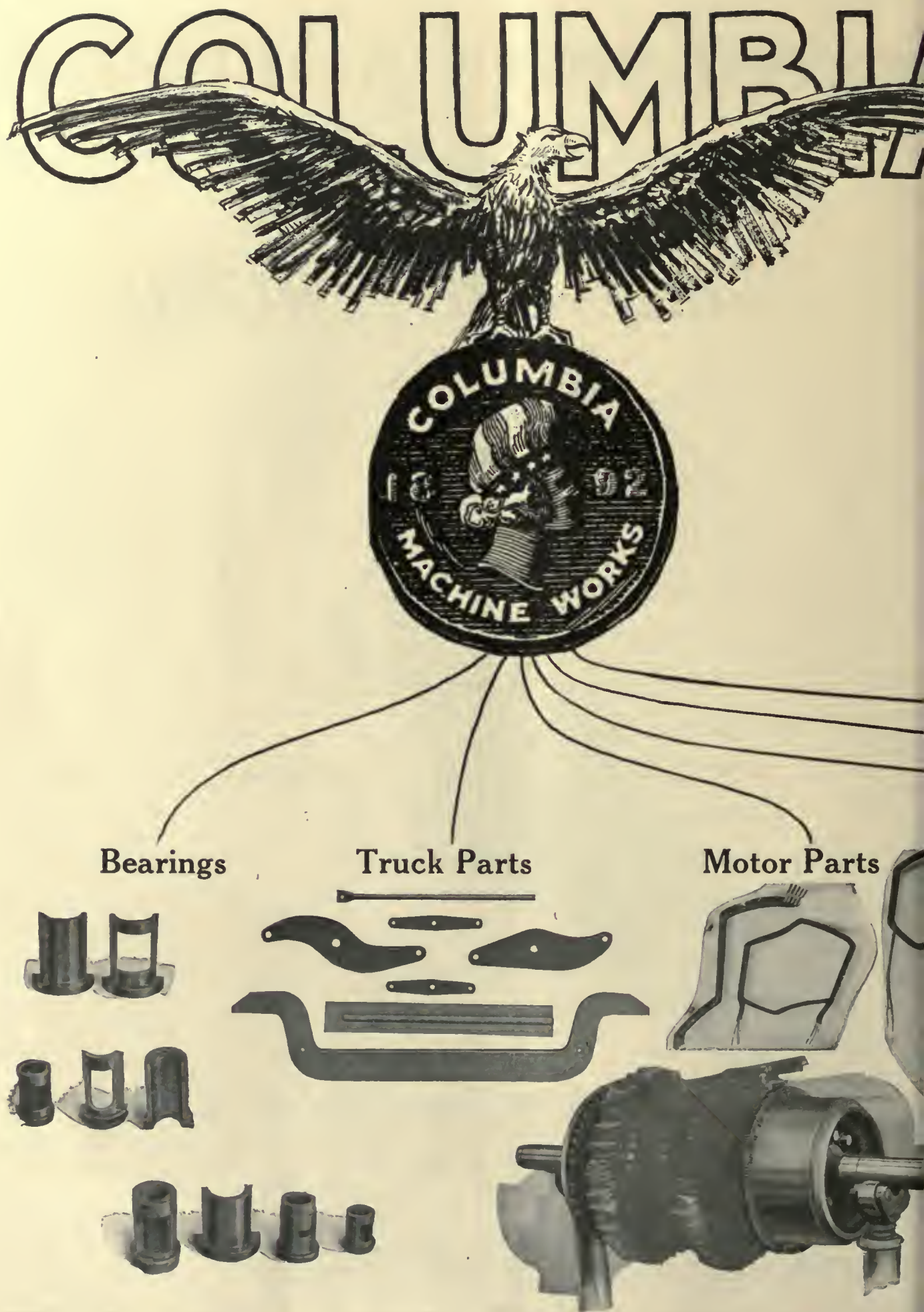
—*they're BOYERIZED*

- ★ Brake Pins.
- ★ Brake Hangers.
- ★ Brake Levers.
- ★ Pedestal Gibs.
- ★ Brake Fulcrums.
- ★ Center Bearings.
- ★ Spring Post Bushings.
- ★ Spring Posts.
- ★ Bolster and Transom Chafing Plates.
- ★ Manganese Brake Heads.
- ★ Manganese Truck Posts.
- ★ Bushings.
- ★ Bronze Bearings.
- ★ McArthur Turnbuckles.

Bemis Car Truck Company
Electric Railway Supplies
Springfield, Mass.

Representatives:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.



a gem of a notion!

The Service Station Idea applied to your electric railway maintenance work

MODERNIZATION means more than good resolutions — it involves the use and installation of efficient equipment, up-to-date devices, and serviceable materials.

Columbia means an organization devoted to servicing electric railway requirements along these lines. It undertakes prompt supply of the finest quality parts, at prices well below the true cost of trying to manufacture them in your own repair shops.

Door and Step Mechanisms
Air Brake Handles
(brass and malleable iron)
Controller Handles
(All types operating and reversing)
Signal Bells
Door Truck and Sheaves
Platform Gongs
Controller Parts and Handles
Trolley Wheels, Poles, and Harps
Destination Signs (Steel)
"Nevesplit" Headlining

Grid Resistors
Armatures and Armature Parts
Commutators (All types)
Field Coils
Brush-holders and Brush-holder Springs
Truck Parts
Brake Rigging, Forgings, etc.
Bearings (Axle and Armature)
Castings in Aluminum; Brass; Bronze;
Cast Steel; Grey Iron; Malleable Iron;
White Metal and Zinc
Brake, Door and other Handles

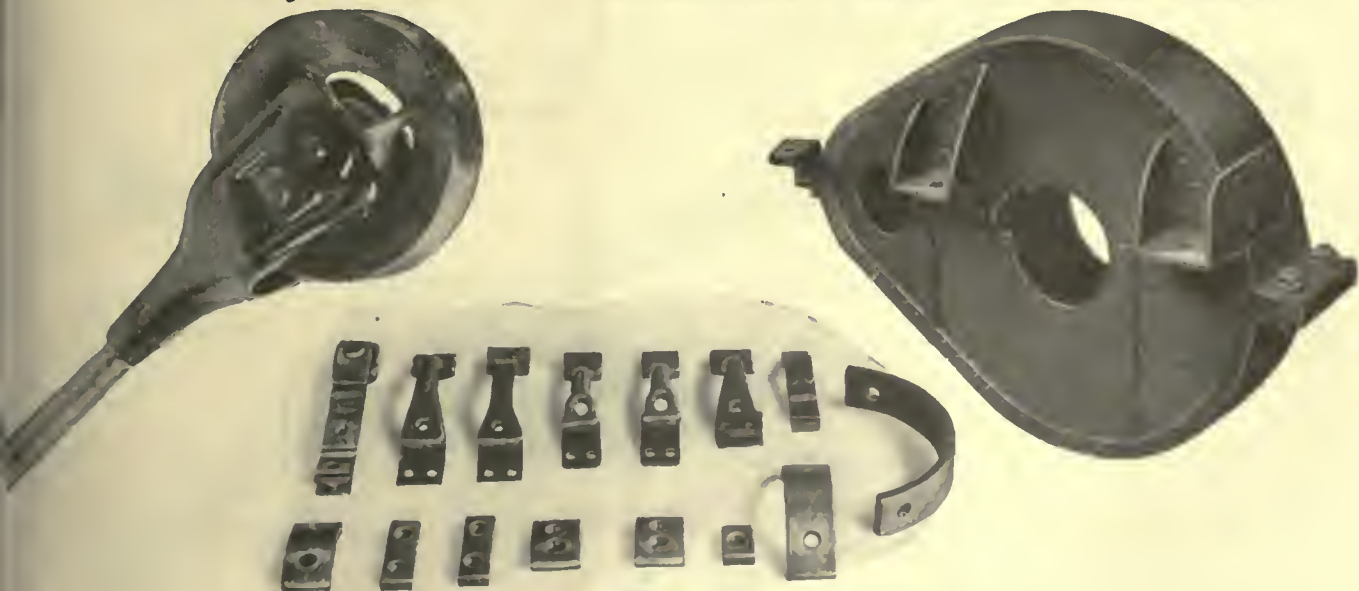
Car Trimmings
Forgings of All Kinds
Gear Cases (Steel or Malleable Iron)
Third-rail Shoe Beams and Accessories
Babbitting Molds
Banding and Heading Machines
Car Hoists and Replacers
Coil Taping Machines for Armature Leads
Coil Winding Machines
Pinion Pullers
Pit Jacks
Signal or Target Switches
Tension Stands

Columbia Machine Works
3313 ATLANTIC AVE., BROOKLYN, N. Y.

Trolley Parts

Controller Parts

Gear Cases





SAMSON SPOT TROLLEY CORD

is tough and durable, made to withstand the powerful jerk on the cord when the pole goes off the wire. It outlasts ordinary trolley cords many times. It eliminates cord troubles, saves time and lowers costs.

The value of Samson Spot Cord lies in the extra-quality stock from which it is made, its hard smooth braid and thorough waterproofing.

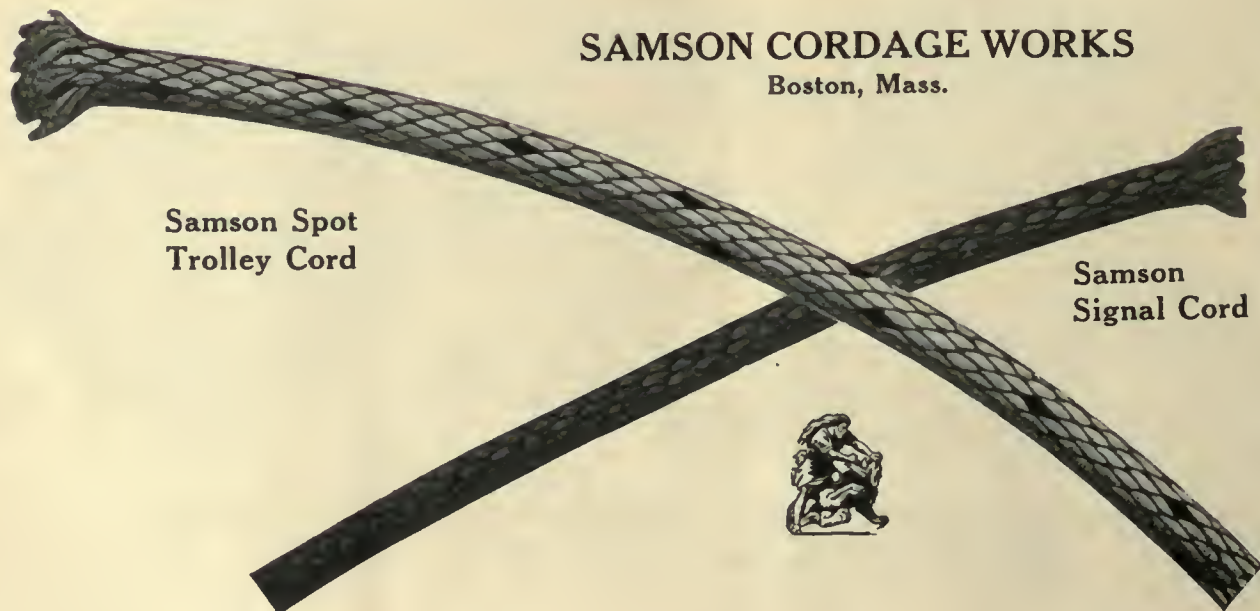
The colored spots are our trade mark and assure the buyer of a cord having unusual resistance to wear and weather.

Samson Bell and Register Cord is the same extra quality as Samson Spot Trolley Cord. Made in drab, mahogany, and white, with wire centre if desired.

Send for Samples and Full Particulars

SAMSON CORDAGE WORKS

Boston, Mass.

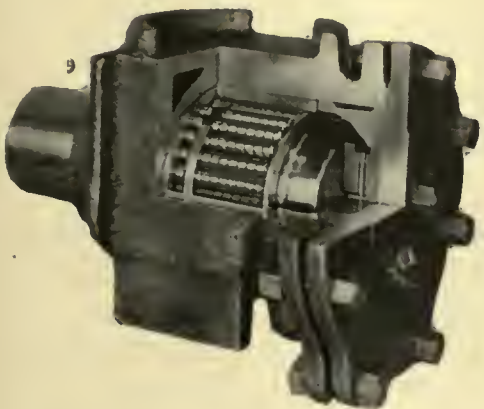
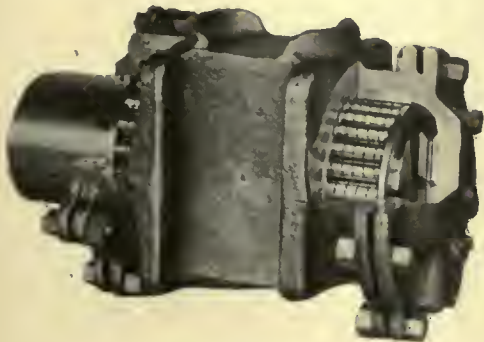


Samson Spot
Trolley Cord

Samson
Signal Cord



Car Bearings Designed To Eliminate Needless Waste



Hyatt equipped journal boxes for electric railway cars, cut away to show the bearings.

THE greatest single cause of waste in street railway operation is the friction in car journal boxes.

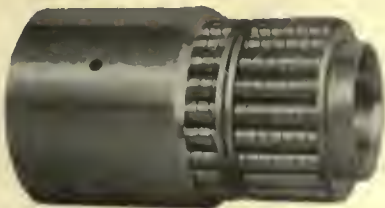
Until recently this waste was considered unavoidable. Now, however, with the development of Hyatt railway bearings a definite means for its removal is at hand.

Hyatt bearings eliminate plain bearing friction and its attendant destructive wear, providing in its place the freely turning action of steel rollers. These rollers and the parts for retaining them are of sound construction and high grade materials, capable of meeting the severe requirements of railway service.

It is not difficult to see that the use of Hyatt bearings in journal boxes must result in power saving, lighter service for motors, lubrication economies, long bearing life and generally dependable car operation.

Several companies are now getting these results. That it is possible for you to get them will be demonstrated by our engineers, on request, without placing you under any obligation.

HYATT ROLLER BEARING COMPANY
NEWARK, NEW JERSEY



The Hyatt railway bearing—carries standard rated loads within standard truck dimensions.

GRIFFIN



F. C. S. WHEELS

From the standpoint of both
Economy and *Safety* the
CHILLED IRON WHEEL is
the ideal wheel for *all classes*
of service.

LOW COST
MAXIMUM
MILEAGE

All Foundries equipped for turning
axles, boring and mounting wheels.

GRIFFIN WHEEL COMPANY

410 N. Michigan Ave.

Chicago, Ill.

FOUNDRIES:

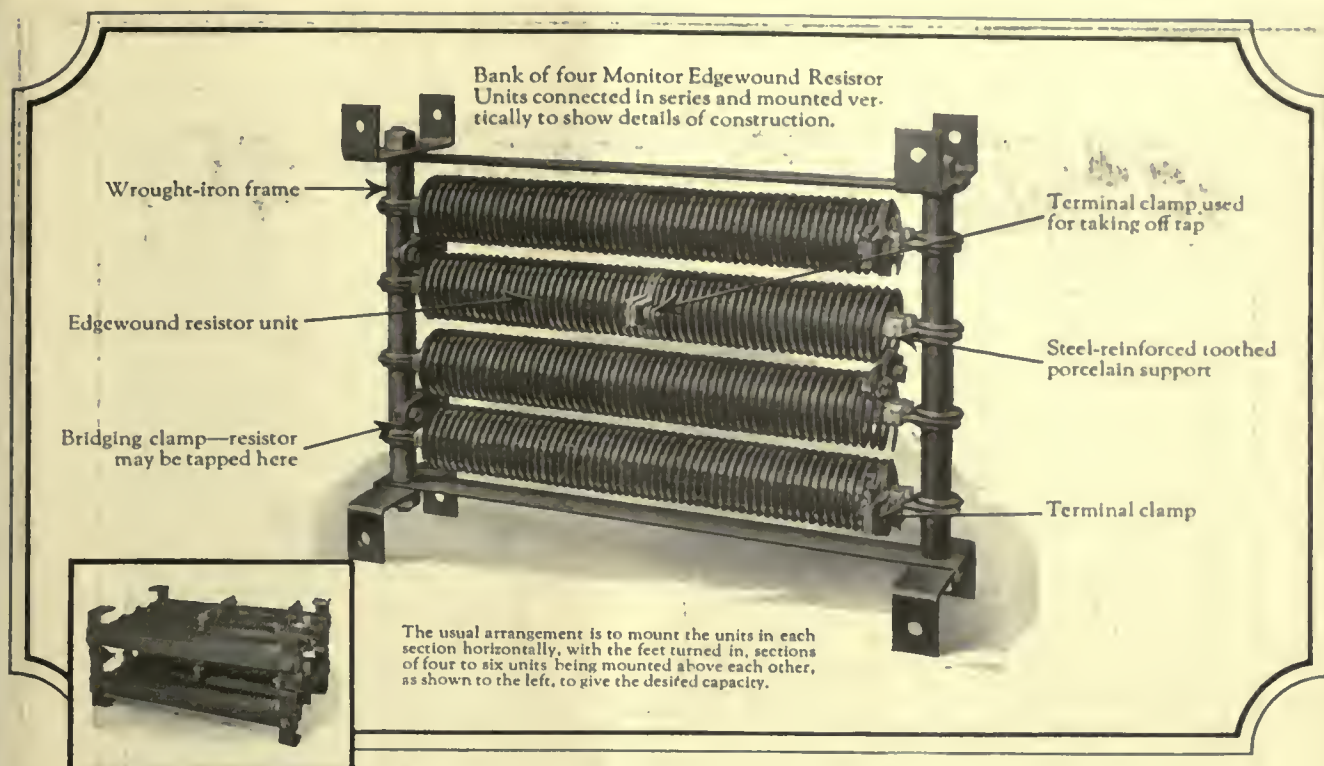
Chicago
Tacoma

Detroit
Kansas City

Denver
Los Angeles

St. Paul

Boston
Council Bluffs



A new heavy-current resistor

Unbreakable — Compact — Light in Weight

THE insistent need for something better than cast-iron grids and equivalent forms of ribbon resistors led to the development of the Monitor Edgewound Resistor, which combines the best of each. Monitor Edgewound Resistors have the mechanical simplicity of the grid, the electrical characteristics of the ribbon and heat dissipating properties far greater than either.

Special alloy ribbon which is of uniform composition, moisture-proof, acid-resisting and of negligible temperature co-efficient of resistivity is wound on edge in helical form. Each unit is mounted on a steel re-inforced porcelain support which supports and separates every convolution at two diametrically opposite points. This method of construction permits free radiation and convection of heat and relieves the units from mechanical strain, en-

abling the resistor to be operated at any temperature up to red heat without sagging or injury.

Two simple forms of clamps provide facilities for connecting units in series or in parallel or for taking off taps at any desired points along the units.

The only joints are at the terminals of the sections whereas a cast-iron grid section has approximately 50 in addition to its terminals.

When rating the Monitor Edgewound Resistor at half the air temperatures permitted by the fire underwriters, the ratio of volume for a 4500-watt rheostat is 1 to 1.5 and the ratio of weight 1 to 1.65 when compared to an equivalent cast-iron grid resistor.

The Original
"Just Press a Button"
System



Complete information about this new resistor is given in Bulletin 107, which will be sent to you on request.

Monitor Controller Company, 500 E. Lombard St., Baltimore, Md.

Birmingham
Boston

Buffalo
Chicago

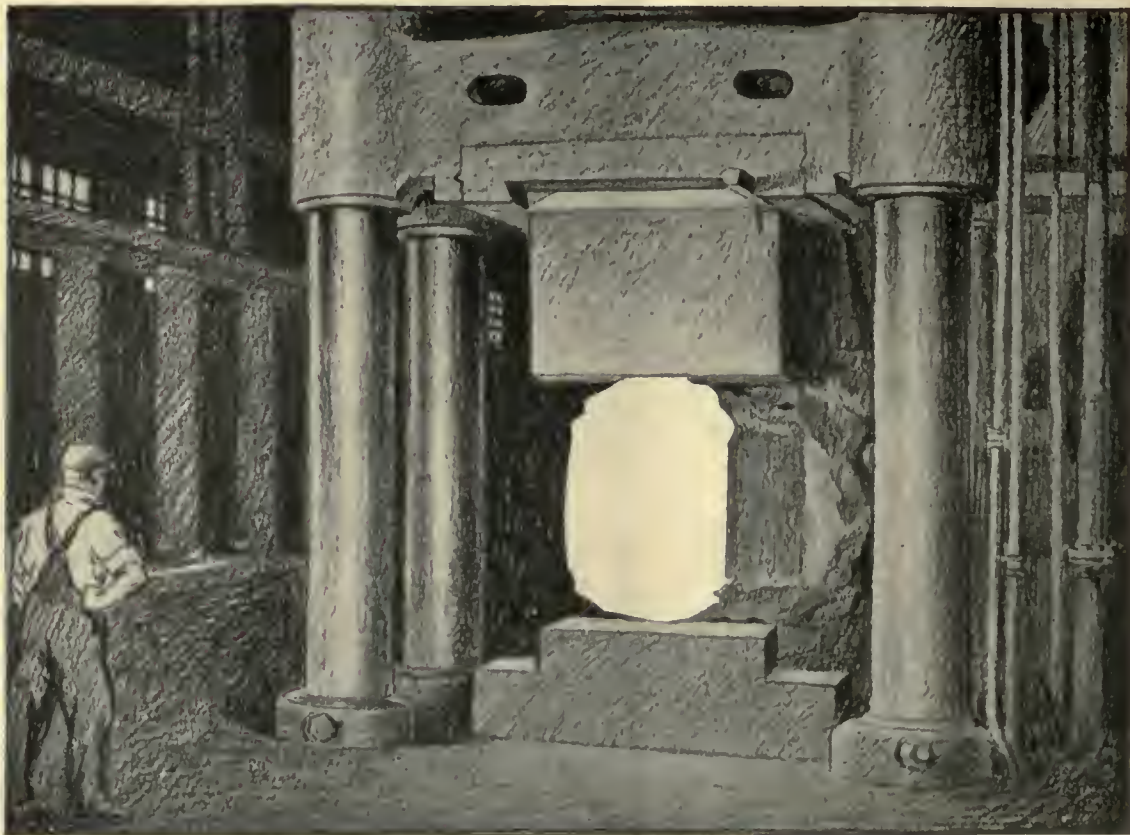
Cincinnati
Cleveland

Detroit
New Orleans

New York
Philadelphia

Pittsburgh
St. Louis

Monitor Edgewound Resistor



MAKING 17-TON FORGING UNDER 2500 TON PRESS



*"Not only to make better products but to make them better understood
—not only to sell but to serve, assisting those who buy to
choose as well as use their purchases—this is
the privilege if not the practice of all
modern manufacturers."—Vauclain.*

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES

CHICAGO
ST. LOUIS
NEW YORK

HOUSTON, TEXAS
PORTLAND, ORE.

RICHMOND, VA.
SAN FRANCISCO

BOSTON
ST. PAUL, MINN.

PITTSBURGH, PA.
LOS ANGELES, CAL.
MEXICO CITY, MEX.

WORKS: BURNHAM, PA.



Chilled Iron Wheels

possess the required factors of safety at the lowest cost.

The hard wearing surface of the tread has sufficient bearing power to carry the maximum load of any car yet designed without permanent deformation, and has the maximum resistance to abrasion.

The hard tread and flange have a maximum wearing value.

The wearing surface of the tread and flange causes the least abrasion to the rail and offers the least resistance to rolling. There is a consequent saving in rail replacement cost and fuel consumption.

The metal of the tread produces the greatest co-efficient of brake shoe friction, yet removes the least quantity of brake shoe metal. Braking efficiency insured with decrease in brake shoe consumption over other types of wheels.

They carry a service guarantee.

Cost Less Per Car Mile

ASSOCIATION OF MANUFACTURERS
OF CHILLED CAR WHEELS

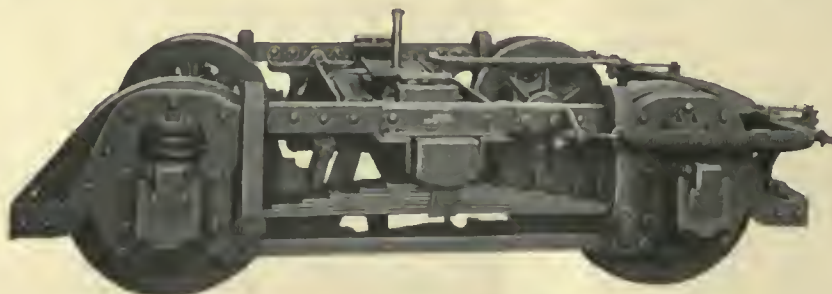
1847 McCormick Building
CHICAGO

50 PLANTS ~ DAILY CAPACITIES 20000 WHEELS

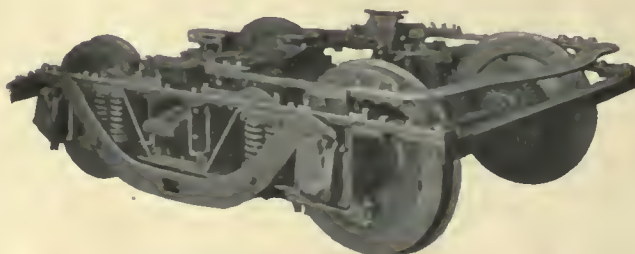
BALDWIN

ELECTRIC MOTOR TRUCKS

Internationally Known For Their Simplicity,
Strength and Perfect Riding Qualities

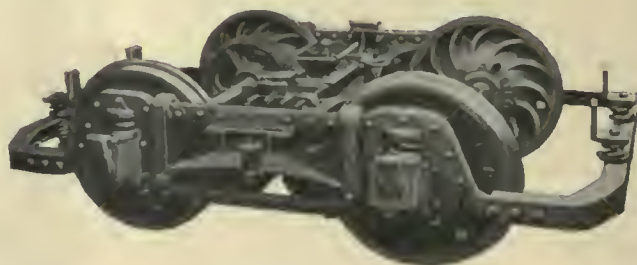


Motor Truck, Class "R," with "Inside Hung" Motors
The two-motor equipment truck for city service. One of its main characteristics is its low cost of maintenance.



Motor Truck, Class "A," with "Inside Hung" Motors

An improved truck built to meet the most severe conditions of high speed electric interurban and street railway service.



Motor Truck, Class "L," with "Outside Hung" Motors

A two-motor truck which may be used where the clearance under the car body is such that wheels of equal size may be employed.

Baldwin Improved Motor Trucks are "Locomotive Built." On many American and Foreign Electric Railways, they are standard equipment.

Full information regarding motor and trailer trucks forwarded on request.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U. S. A.

Cable Address, "Baldwin, Philadelphia"

MOTOR TRUCKS

HOFFMANN **PRECISION ROLLER BEARINGS**

For the Heavy Loads and Hard Service of Electric Railway Operation

These heavy-duty bearings—manufactured to unequaled standards of precision—afford, by their design and specially treated materials, the maximum of serviceability under the conditions which electric railway service imposes—conditions involving heavy loads, temporary overloads, shock, jar and vibration. They offer to manufacturers and user of electric railway equipment, new opportunities for reduced maintenance costs and improved service.

Our engineers will welcome an opportunity to work with yours, in applying these high duty, high-precision bearings to your equipment with a view to realizing in highest degree the advantages and economies which follow the adoption of anti-friction bearings of proved dependability.

**NORMA-HOFFMANN
BEARINGS CORPORATION**

Stamford — Connecticut

PRECISION BALL, ROLLER AND THRUST BEARINGS





Street Cars—Trucks—Bus Bodies Snow Fighting Equipment

McGuire-Cummings Mfg. Co. builds city and interurban cars and trucks, safety cars, combination and work cars, snow-plows, sweepers, bus bodies and electric locomotives.

Back of all equipment built by McGuire-Cummings are the results of over twenty years of specialization in the construction of all classes of rolling stock for the

successful operation of electric railways.

The McGuire-Cummings engineering department is at the service of transportation companies considering the matter of new equipment. They will be pleased to submit specifications and drawings and to quote thereon or submit proposals on specifications furnished.

McGUIRE-CUMMINGS MANUFACTURING CO.,

General Offices: 111 W. Monroe St., Chicago, Ill.



If these two standard electric railway books are not on your desk—let a ten-day free trial prove why they should be (Send the coupon)



**Blake and Jackson's
ELECTRIC RAILWAY
TRANSPORTATION**

New Second Edition

By HENRY W. BLAKE
Editor, Electric Railway Journal and
WALTER JACKSON
Formerly Associate Editor Electric Railway Journal

Second Edition

437 pages, 6x9, 121 illustrations, \$5.00 net, postpaid

A thorough revision of a book covering every important phase of modern electric railway transportation, giving all of the latest developments and all of the latest methods used to meet present-day traffic requirements and competitive activities.

The book gives the most valuable kind of information on getting the cars over the line—handling traffic difficulties—making and maintaining schedules—collecting fares—securing the proper public relations—using the motor bus as a supplementary service—meeting outside bus competition—trackless trolleys—keeping the working force efficient—and hundreds of other important electric railway points.

CHAPTER HEADINGS

I.—Organization and Definitions. II.—Adjustment of Traffic to Service. III.—Accelerating Traffic Movement Along the Line. IV.—Accelerating Traffic Movement on the Car. V.—Car Types in Relation to Traffic. VI.—City Timetables—Preliminaries. VII.—Interurban Schedules and Dispatching. VIII.—Fares. IX.—Fare Collection Practices and Devices. X.—Public Relations. XI.—Promotion of Passenger Traffic. XII.—Traffic Signs for Cars, Station and Road. XIII.—Motor-Bus Operation by Electric Railways. XIV.—Selection and Training of Men. XV.—Wages and Wage Agreements. XVI.—Employee Relations. XVII.—Discipline of Trainmen. XVIII.—Forms of Extra Pay.

Examine these books free—they help

See these new revised electric railway books for yourself. Let us send them to you for ten days' free examination. No obligation to keep them unless you want them—no bother—no agents—no red tape. You simply agree to remit for the books or to return them, postpaid, within ten days.

**Richey's
ELECTRIC RAILWAY
HANDBOOK**

New Second Edition

By ALBERT S. RICHEY
Consulting Engineer, Professor of Electric Railway
Engineering, Worcester Polytechnic Institute

798 pages, flexible, pocket size, 600 illustrations,
\$4.00 net, postpaid

The 1924 Richey is virtually an encyclopedia on modern electric railway organization, administration and operation. It should be in the reference library of every electric railway in the country. A few new ideas gleaned from one section of this helpful hand-book will repay the small price of the book over and over again.

Electric Railway executives, engineers and operating men have long respected Richey's Electric Railway Handbook as the one great pocketbook of practice data, formulas and tables in the electric railway field. The new 1924 second edition of Richey covers the latest developments—describes new methods—records changes in theory and practice.

It covers every phase of electric railway work from Roadbed and Track to Signals and Communication. It gives priceless information on problems which come up constantly in everyday electric railway practice. It should be in the hands of non-technical managers as well as operating men and engineers.

CHAPTER HEADINGS

I.—Roadbed and Track. II.—Car Houses and Shops. III.—Train Movement. IV.—Railway Motors. V.—Controlling Apparatus. VI.—Current Collecting Devices. VII.—Trucks. VIII.—Braking. IX.—Cars. X.—Transmission and Distribution. XI.—Signal and Communication.

A man may work without the great books of his business—but not as well as he can and does with them.

Clip this coupon
and mail it *now*

McGraw-Hill Book Company, Inc.

*Publisher of books for
Electric Railway Journal*

370 Seventh Avenue

New York

FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc.
370 Seventh Avenue, N. Y.

Send me the books checked for 10 days' free examination:

☐ Blake & Jackson's Electric Railway Transportation, \$5.00

☐ Richey's Electric Railway Handbook, \$4.00

I agree to remit for the books or to return them, postpaid, within 10 days of receipt.

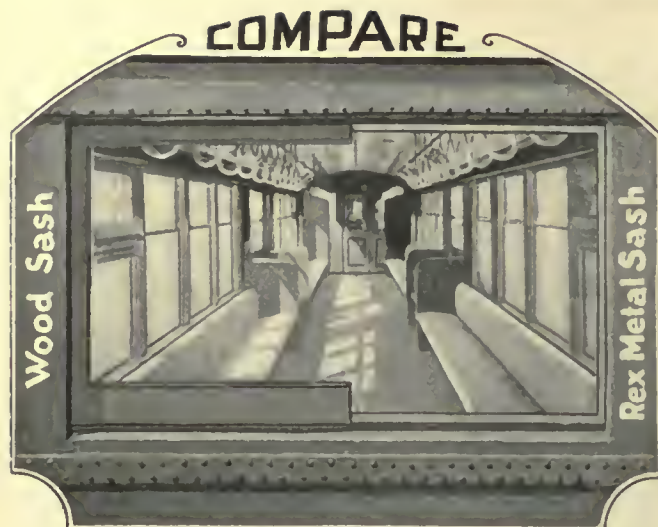
Name.....

Address.....

Position.....

Company.....

E 1-3-25



LIGHT

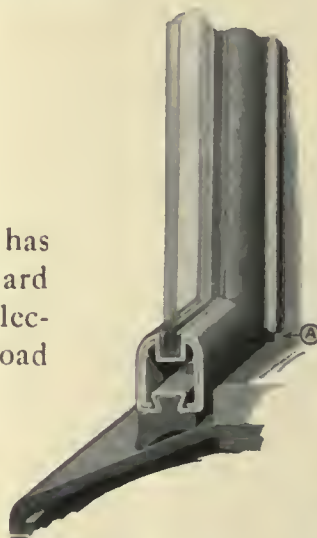
Thru The Window



The Oil Lamp, years ago, was discarded for Electricity to secure Better Light, increase safety and to cut Maintenance Costs.

Rex METAL Sash

and weatherstrip



For the same reason, has been adopted as Standard Equipment by many Electric Traction and Railroad Companies.

Write us for information regarding
COMPLETE WINDOW EQUIPMENT

All Metal Rollers
Ring Fixtures
Weather Strip

REX

Manufactured by

Metal Sash
Locks and Lifts
Curtains

The Curtain Supply Company
Elkhart, Indiana

355 West Ontario St.,
Chicago, Ill.

50 Church St.,
New York, N. Y.



Imazi

The Kaffir gets a wife via the bargaining route.

For days he haggles with the girl's father over whether he will give eleven or twelve cows for her.

Haggling about price is a primitive instinct that has percolated right down into modern business.

Some feel that if they'll only haggle long enough they can get Morganite for the price of run-of-mill carbon brushes.

They can't—any more than can they get Morganite service from run-of-mill brushes.

Reminds one of the fellow who said "Gee, it's tough to have to pay 50 cents a pound for beef-steak." To which the answer is "Yes, but it's tougher when you pay 25."

Morganite

Brush Co., Inc.

Main Office and Factory:
519 West 38th St., New York

DISTRICT ENGINEERS AND AGENTS

Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn Ave.
Cincinnati, Electrical Engineering & Mfg. Co., 607 Mercantile Library Building.
Cleveland, Electrical Engineering & Mfg. Co., 422 Union Building.
Philadelphia, Electric Power Equipment Corp., 412 North 18th St.
Baltimore, O. T. Hall, Sales Engineer, 1926 Edmondson Ave.
Revere, Mass., J. F. Drummey, 75 Pleasant Street
Los Angeles, Special Service Sales Co., 502 Delta Building.
San Francisco, Special Service Sales Co., 202 Russ Building.
Toronto, Can., Railway & Power Engineering Corp., Ltd., 101 Eastern Ave.
Montreal, Can., Railway & Power Engineering Corp., Ltd., 326 Craig St., West
Winnipeg, Can., Railway & Power Engineering Corp., Ltd., P. O. Box 325.



GLASS!

The great Insulator

Uniform insulating qualities, freedom from internal strains or deterioration due to age, high dielectric strength, are qualities inherent in this material, to which Hemingray has added scientific annealing, giving adequate mechanical strength, and correct design, producing high flash over value, and

an outer petticoat that will not break beyond the point where it retains a high percentage of its original flash over resistance. Standardized types in various sizes make for high efficiency and great economy to maker and user.

Send for Descriptive Bulletin

Hemingray Glass Company, Muncie, Ind.

Established 1848—Incorporated 1870

A Paying Investment

Long-Bell Poles pay dividends in long-time service, dependability and satisfaction. They are especially practical for electric railway use because their unusual strength and durability serve to eliminate traffic interruptions due to pole failures.

Long-Bell Poles are air-seasoned, then creosoted full length under pressure. They resist decay and fire. They are strong, sturdy and attractive.

Accompanying photograph shows Long-Bell Poles of the Indiana Service Corporation doing triple service between Fort Wayne and Huntington, Indiana.

We will furnish promptly, on request, some very interesting and profitable facts on the strength and durability of Long-Bell Poles. Write us.

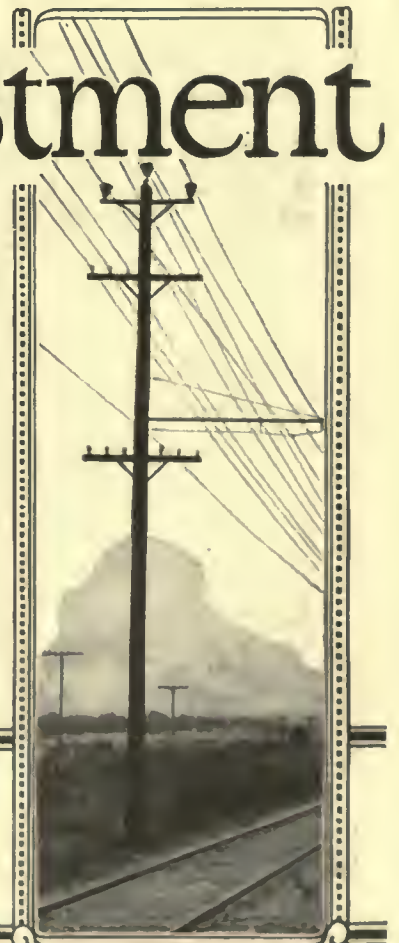
The Long-Bell Lumber Company

1851 R. A. Long Building,

Kansas City, Missouri

Long-Bell

CREOSOTED Yellow Pine Poles



ALLIS-CHALMERS

AA-7B Air Compressor



Compressor for Street Car Mounting

A single acting duplex compressor with crank case and cylinders integral. One-piece cylinder-head for both cylinders contains suction and discharge valves. Trunk pistons operated by connecting rods with bushings provided for taking up wear.

Heavily designed crankshaft of high-grade steel turns in journal bearings of ample proportions to insure minimum wear.

Herringbone Gears transmit power from motor shaft to crankshaft with practically silent operation.

Lubrication is positive and efficient. Connecting rods dip into the oil and splash reaches all working parts. Gears run in oil.

Send for Bulletin

ALLIS-CHALMERS MANUFACTURING CO.

MILWAUKEE, WIS. U.S.A.



Quick Accurate Permanent

*A Record of Each Sale
When the Sale is Made*

The sale of electric railway transportation is strictly a retail business proposition and should comply with those methods which have been found most successful in other lines of merchandising.

The only safe method is to mechanically indicate and record the amount of each sale in the presence of the purchaser at the time the sale is made.

Ohmer Fare Registers indicate and record the exact amount and class of fare paid at the time it is paid. They apply to electric railroading the correct methods which have brought success to countless retail merchants.

OHMER FARE REGISTER COMPANY
Dayton, Ohio, U. S. A.



FERALUN
Anti-Slip Treads

*are
safe*

Northern Texas
Traction Co., cars
in Fort Worth
are "Feralun"
equipped.

**F
E
R
A
L
U
N**

"Feralun" anti-slip treads are used by many street railway companies the country over, in the interests of "Accident Prevention."

One conspicuous example is the Coffin Prize Medal Road—the Northern Texas Traction Company, of Fort Worth, Texas, which has made a notable record for safe and efficient operation.

"Feralun" received unique recognition at the recent A.E.R.A. Convention at Atlantic City. Out of five cars exhibited on the boardwalk—four were "Feralun" equipped.

"Feralun" is a real anti-slip material—with unequalled lasting qualities.

Try a sample

We will gladly send a piece of "Feralun" for you to test.

**American Abrasives
Metals Company**
50 Church Street
New York City, N. Y.

A Good Resolution



Bond Tester in Use, and Scale

Buy a ROLLER-SMITH Bond Tester—

ROLLER-SMITH

Bond Testers are simple, accurate, rugged and—
above all—quick



Bar in Place on "T"
Rail Showing Saw
Blade Contacts



Bar in Place on "C" Rail
Showing Saw
Blade Contacts

for every rail head

Equipped with saw-tooth contacts which "bite" into any rail-head, the ROLLER-SMITH Bond Tester makes short and easy work of this important maintenance problem. The two types of contact supplied are illustrated above. One man can handle this equipment with ease. Simply drop the contact bar on the rail, rock it back and forth a few times to obtain good contact, turn the hard rubber button until the small pointer is at zero, then read the resistance of the bond direct in units of feet of rail. *That's all there is to it.*

There are more ROLLER-SMITH Bond Testers in use throughout the world than all other makes combined.

Write for Bulletins G-200 and G-201.

ROLLER-SMITH COMPANY
Electrical Measuring and Protective Apparatus

MAIN OFFICE
237 Broadway, NEW YORK

WORKS
Bethlehem, Penna.

Offices in Principal Cities in U. S. A. and Canada
Also in Havana, Cuba.

W**W**

Model 310
Wattmeter



Maintaining Transit Service

THERE is no room for guess work in Electric Railway Operation. Modern practice demands that every unit function at its best.

To keep your electrical equipment operating continuously, let Weston Instruments be your guide — in the power station — in the standardizing laboratory — in the repair shops — and in the field.

From one extreme to the other — for checking instruments in the standardizing laboratory or for testing batteries and ignition systems of motor buses, there is a Weston instrument exactly suited to your needs that will give you a lifetime of accurate and dependable service.

WESTON ELECTRICAL INSTRUMENT CORP.

18 Weston Avenue, NEWARK, N. J.

Branch Offices in All Principal Cities

WESTON

Electrical Indicating Instrument Authorities Since 1888

STANDARD—The World Over



Type EC Braze Bond

Plan Now for your Spring Rail Bonding

That section of your line where the voltage was so poor this summer — where your cars crept up the grades, and the motormen "cussed" the power—that sore spot needs a few new rail bonds and your troubles there are over.

Whether you are re-bonding old rail, or laying and bonding new—the best bonds are none too good.

Erico Braze Bonds

cannot be surpassed in either conductivity or long life. They are installed at small cost, too.



Type ET Braze Bond

Types for head or web of rail, concealed, special or cross bonds.

Let us place the facts before you.

The Electric Railway Improvement Co.
Cleveland, Ohio

- (2) "Free Winding Tension Spring" Handles wet rope efficiently.
- (3) "Ratchet Wind" Makes Retriever operation easy.
- (4) "Emergency Release" Great Convenience and added safety.
- (5) The last heading is "Perfect Automatic Lubrication of Every Part."

(1)

"No Wear Check Pawl" Never strikes point of tooth — always slips into full engagement.



EARLL Catchers and Retrievers

*Yours
for a Happy
New Year
—1925—*

and add—

simplicity!

FIVE big features of Earll superiority are indicated above. Yet these are all incorporated and included in Earll devices which mechanically speaking are unchallenged leaders in simplicity. There are no screws. Fewer parts are used. Complete lubrication is provided through a one-shot oil port.

If you're not familiar with Earll equipment, we'll gladly send you on approval a sample Catcher or Retriever to inspect at your leisure. Write us!

C. I. EARLL, York, Pa.

Canadian Agents:
Railway & Power Engineering Corp., Ltd., Toronto, Ont.

In all other foreign countries:
International General Electric Co., Schenectady, N. Y.

Ramapo Auto-
matic Return
Switch Stand
Style No. 37



Ramapo Return Switch Stands Medium Heights Dwarf Styles

Ramapo automatic return switch stands are especially designed for passing sidings on private right of ways, where it is desired that the switch point always remain in the same position after having been run through.

Target always indicates position of switch points, always showing whether the switch points are open or closed or if partially held open by an obstruction.

The throw is rigid. The springs in the base fixture do not intervene between the hand lever, switch stand spindle and switch points. They are a part of the base fixture, to which the throwing mechanism is latched when the hand lever is lowered.

Write for further information or for catalogues on switch stands, switches, frogs, crossings, etc., for tee rail track. Manganese construction a specialty.



RAMAPO AJAX CORPORATION
HILLBURN, NEW YORK

Works
Hillburn, New York
Niagara Falls, N. Y.
Chicago, Illinois
East St. Louis, Ill.
Pueblo, Colorado
Superior, Wisconsin
Niagara Falls, Canada

Sales Offices at All Works
also
30 Church Street
New York
McCormick Building,
Chicago

Chillingworth One Piece Gear Case

Made from deep drawn open hearth steel

40% lighter and more durable than malleable iron cases



Built for Service

Chillingworth Manufacturing Co.

Jersey City, N. J.

Sold in Canada by Railway & Power Engineering Corp., Toronto, Montreal, Winnipeg.

Sold in England by Croyden Engineering Co., Ltd., Croyden.



*The Complete Shop
Testing Outfit*

TS-12 Testing Unit

Here is a complete insulation testing unit for motors—generators and various kinds of coils wherein the test voltage varies from 500 to 3000. The TS-12 Testing Unit consists of a 2 kva., 60 cycle, 220 volts primary. 500 to 3000 volts, 5 step secondary, air cooled, transformer complete with plug panel and switchboard equipment. This same equipment can be furnished to supply voltage ratings on the secondary from 1000 to 6000 volts and up to 5 kva. capacity.

We also make this same unit in a Portable Type.

Our new Bulletin 1025-B covers a complete line of testing transformers. Copies on request.

American Transformer Company
Newark, New Jersey

*Send
for
Bulletin
1025-B*

-AMERICAN TRANSFORMERS-



These attractive one-man, double-truck safety cars were delivered to the Helena (Mont.) Light & Railway Co.

*Another lot
built by the*

PERLEY A. THOMAS CAR WORKS

High Point, N. C.

“THOMAS-BUILT” cars are going far and wide in ever-increasing numbers.

Why do distant traction companies come to High Point, North Carolina, for new cars? Because “Thomas-built” cars are built with an individual care and attention to details which insures attractive finish throughout and a long life of satisfactory service. Furthermore Perley A. Thomas’ prices and quick deliveries appeal to the railway field.

Let us quote on your new cars.

DIXON'S Silica-Graphite PAINT

is immune from attacks by acids, gases and fumes. Impervious to water and not affected by heat or cold. It dries into a smooth elastic surface and lasts for long periods of time because of the pigment, flake silica-graphite and the vehicle, pure boiled linseed oil.

Dixon's is a paint in which the flake graphite and silica are *naturally* and not artificially combined, and this feature is essential to long life, efficient surface protection, elasticity and resistance to dampness.

Write for Booklet No. 180B.

JOSEPH DIXON CRUCIBLE COMPANY

Jersey City, New Jersey

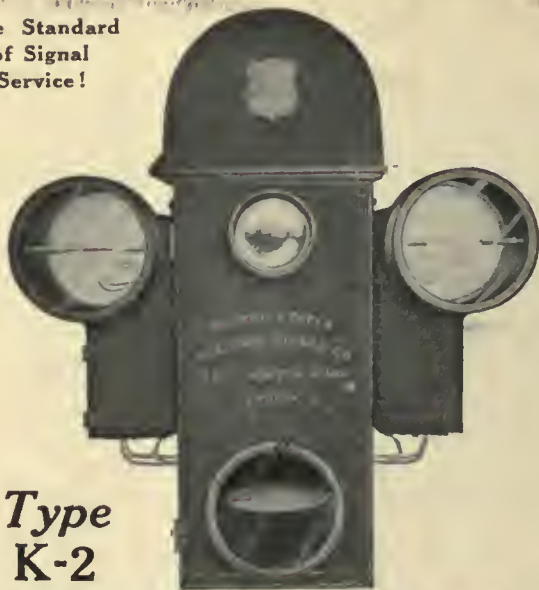
Established 1827



DIXON'S Silica-Graphite PAINT

U. S. ELECTRIC SIGNALS

The Standard
of Signal
Service!



Type
K-2

Most adaptable and reliable signal
for electric railway requirements

Widely used by leading companies for single track operation, to promote safe, speedy and uniform schedules. Adapted to meet all requirements. Semaphore and light indications for day and night. Positively fixed, individual proceed aspects, indicate counting of fifteen following cars into block, giving unmistakable evidence of protection. In Type K-2 duplicate lamps cut in automatically in case of burn-out. Neutral aspects (i.e., no indications) when block is uncoupled.

UNITED STATES ELECTRIC SIGNAL CO.
WEST NEWTON, MASS.

REPRESENTATIVES:
Western: Frank F. Bodier, Monadnock Bldg., San Francisco, Calif.
Foreign: Forest City Electric Service Supply Co., Manchester, England.

DUNDEE "A" AND "B" FRICTION TAPES



are
Okonite
Products

'Nuff Said!



Write for Samples and Circulars

THE OKONITE CO., Passaic, N. J.
Incorporated 1884

Sales Offices: New York—Atlanta—Pittsburgh—San Francisco
Agents: Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.
Canadian Representatives: Engineering Materials Limited, Montreal.



AIMCO Electric Railway
Automatic
Signals

for Accessibility
and Reliability

EST. 1868 INC. 1918
"American"
INSULATING
MACHINERY
COMPANY

Philadelphia, New York, Paris, England

Sales Agents:
Electric Service Supplies Co.
Philadelphia New York Chicago



AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE
AND CABLE

PAPER INSULATED
UNDERGROUND CABLE

MAGNET WIRE

Reg. U. S. Pat. Office
Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 178 Federal; Chicago, 112 W. Adams;
Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

STANDARD Underground Cable Company

Electric Wires and Cables of Quality

Branch Offices:

Boston Philadelphia Pittsburgh St. Louis New York
Washington Chicago Detroit San Francisco

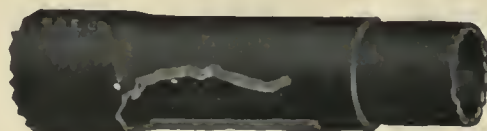
Shaw Lightning Arresters

Standard in the Electric Industries
for 35 years

Henry M. Shaw

150 Coit St., Irvington, Newark, N. J.

ELRECO TUBULAR POLES



THE "WIRE LOCK" THE CHANFERED JOINT

COMBINE

Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.

CINCINNATI, OHIO

New York City, 30 Church Street



ELECTRICAL WIRES AND CABLES

John A. Roebling's Sons Company
Trenton, New Jersey J-1707

Chapman Automatic Signals

Charles N. Wood Co., Boston



American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

*Send for new
Rail Bond Book*

**American Steel & Wire
Company**
CHICAGO
NEW YORK

KERITE AN INVESTMENT



When you put your money into KERITE you make an investment in service. You do more than buy conductors, insulation and protection. You obtain the best possible combination of the most desirable qualities in permanent form. KERITE remains long after the price is forgotten.

KERITE INSULATED WIRE & CABLE COMPANY
NEW YORK CHICAGO

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of
Water Tube Boilers
of continuing reliability

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 305 Gasco Building



WORKS

Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguilar 104
SAN JUAN, PORTO RICO, Royal Bank Building

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

HORNE & EBLING CORPORATION

50 CHURCH ST.,

NEW YORK, N. Y.

Brass Hardware
For Cars and Buses

Motor and Controller
Parts



Sterling Trolley Bases
and Brakes

Mall. Iron and Brass
Castings

ECONOMIZERS

reduce fuel costs by making use of waste exhaust gases to preheat the boiler feed. Patented construction proven by 20 years of service.

FOSTER

SUPERHEATERS

improve engine, turbine and boiler economy by enabling a given amount of steam to do more work. Over 10,000 installations in stationary power plants.

POWER SPECIALTY CO.,

Boston, Phila., Pitta., Detroit, Kans. City, Chicago, San Fran., Los Angeles, Boulder, Dallas, London

111 Broadway, NEW YORK



This is the
Chisel end
for digging
out hard dirt

Both Ends Useful PAXSON TRACK BROOM

Paxson Track Brooms have been the choice of railway men for over 25 years. Their double utility, low cost and long wearing qualities have maintained this popularity. Send for a sample—you will find this double utility broom a good investment.

J. W. PAXSON CO.
Nicetown Lane and D St.
PHILADELPHIA, PA.



Filled with flat
steel tempered
wire. Fits frogs,
switches and
grooves. It will
stand long, hard
wear.



From virgin forests of clean, unblighted trees Live Chestnut POLES

Attractive Prices Quoted

Our big business in this particular field enables us to quote to railway and electric companies especially attractive prices on 30 ft., 35 ft., and 40 ft. lengths.

We offer a reliable, prompt, and economical source of supply of poles, ties and switch timbers.

COOK POLE & TIE CO.
Commercial Trust Bldg., Philadelphia, Pa.

HERE'S A GOOD SUGGESTION

P. T. L. Inspectors are located in all the large production centers throughout the country, and can therefore, render a thorough, progressive inspection of all electric railway materials you purchase—such as cars, girder rails, track fastenings, transmission towers, high tension cable, creosoted cross ties, creosoted poles for transmission work, etc.

These men are thoroughly familiar with shop practice and manufacturing methods, and their work is absolutely dependable.

Our bulletin 28 gives all the facts—write for your copy now.

PITTSBURGH TESTING LABORATORY

Inspection Engineers and Chemists

PITTSBURGH, PENNA.

NEW YORK: 30 Church St.



Chicago

St. Louis

Cleveland

Birmingham

Cincinnati

BRANCH OFFICES IN

Raleigh

Little Rock

Buffalo

Philadelphia

Dallas

Detroit

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS

COMPLETE LAYOUTS

IMPROVED ANTI-KICK BIG-HEEL SWITCHES

HARD CENTER AND MANGANESE

CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa.

Sales Offices:

Atlanta

Chicago
Philadelphia

Cleveland

Pittsburgh

New York

Pacific Coast Representatives:
United States Steel Products Company

Los Angeles

Portland

San Francisco

Seattle

Export Representatives:

United States Steel Products Company, New York, N. Y.



Use only Awebco Tape on your Armatures. Field Coils have better protection when wound with "AWEBCO Tape." Send for samples.

ANCHOR WEBBING COMPANY
300 Brook Street, Pawtucket, Rhode Island

R. A. HEGEMAN, Jr., President C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions	Economy Electric Devices
Bell Locked Fare Box and Change Maker	Co.'s Power Saving and Inspection Meters
The Aluminum Field Coils	Anglo-American Varnish Co.
Walker Tractor Snow Plows	Varnishes, Enamels, etc.
Cutter-Hammer Electric Heaters	Gilmer Multiple Safety Step Treads
Pittsburgh Forge & Iron Co.'s Products	National Hand Holds
Genesco Paint Oils	Ft. Pitt Spring & Mfg. Co. Springs
E. Z. Car Control Corporation's Safety Devices	Turnstile Car Corporation's Turnstiles
Oarland Ventilators	Anderson Slack Adjusters
Flaxlinum Insulation	Feasible Drop Brake Staffs
Yellow Coach Mfg. Co.'s Single and Double Deck Buses	Dunham Hopper Door Device



TRUCK WITH TOWER IN RUNNING POSITION

TRENTON TOWER

This 3-Section

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

J. R. McCARDELL CO.

Trenton, New Jersey, U. S. A.

"TAYLOR-MADE" TRUCKS

Have proven their SUPERIORITY for over 30 YEARS, for all types of electric railway cars.

Taylor R. H. Double Truck especially designed for PETER WITT Type Cars.

TAYLOR STRAIGHT ACTION BRAKES

Have made a record for

Safety, Low Maintenance Cost and Successful Brake Operation

In the specifications for your new cars include

"Taylor-Made" Trucks Equipped with Taylor Straight Action Brakes

TAYLOR ELECTRIC TRUCK CO., TROY, N. Y.

ESTABLISHED 1892.

"Axle Specialists Since 1866"

Address all Mail to Post Office Box 615, Richmond, Va.

CAR AXLES

J. R. JOHNSON AND CO., INC.

FORGED STEEL AXLES

For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large Shafts, Round Bars, etc.

GALVANIZING

HOT DIP

We have the largest jobbing galvanizing plant and kettles in the United States. We guarantee our galvanizing to stand eight one minute dips in the Standard Copper Sulphate Solution Test. Galvanized Products furnished.

JOSEPH P. CATTIE & BROTHERS
Gaul and Letterly Sts., Philadelphia, Penna.

"Longwear" Pins and Bushings

Hard—Accurate—Uniform



Renewal Materials
for Peckham and
other Trucks

Castings—Forgings
Springs

E. G. Long Company

50 Church Street, New York, N. Y.



Coin Quality TOKENS

UNIFORM BUTTONS
CONDENSER TUBING

Main Office, Mills and Factories
WATERBURY, CONN.

New York Boston Atlanta
Chicago Cleveland Philadelphia
San Francisco Los Angeles



MEMBER COPPER AND BRASS RESEARCH ASS'N



Double Register

Both our latest single and double registers are now equipped for electric as well as mechanical hand or foot operation.

Full Electric Operation of Fare Registers

A completely satisfactory fare registration system is one that has the confidence of the public, the conductor and the accounting department. The simplicity and accuracy of International Registers maintained for more than thirty years, is combined in the later types with the extra speed and convenience of electric operation.

The International Register Co.

15 South Throop St., Chicago

Exclusive Selling Agents for HEEREN Enamel Badges

Fresh Air Without the Slightest Draft

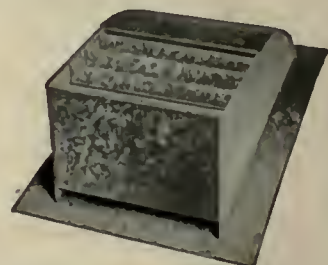
There's a difference!.....patronage proves it! Passengers dodge drafts. Profits dodge cars and buses that permit them.

Winter's at the door! Prepare now to insure comfortable passengers and comfortable profits! N-L Ventilators completely change foul air for fresh many times every hour, at the same time preventing absolutely the entrance of snow, rain, dust, WEATHER.

Write for our booklet, "Superior Ventilation,"
for complete details and information

The Nichols-Lintern Co., 7960 Lorain Ave., Cleveland, Ohio

Canadian Rep.: Railway & Power Eng. Corp., Ltd., Toronto, Ontario



Type "A" for cars having small roof radius. One of a variety for street car and bus use.

HIGH SPEED CHANGE CARRIERS

1924 model
—without
rivets—
ready for
delivery



Supplied in
one or four
tube combinations

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them.

Prices and Literature sent on request

J. L. GALEF, 75 Chambers St., N. Y. C.

Exclusive Manufacturer's Selling Agent



The Zone System of Fares
is Successfully Collected
with the Aid of

CLEVELAND FARE BOXES

Let Us Give You Particulars

The Cleveland Fare Box Co.

Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd.,
Preston, Ont.

Coin Counting and Sorting Machines. Change Carriers

WE are now prepared to make prompt delivery on all types of Scrapers and Life Guards.




Repair parts always on hand

Root Spring Scraper Co.
Kalamazoo, Mich.

100 New Users in the Last Nine Months
KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago


THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



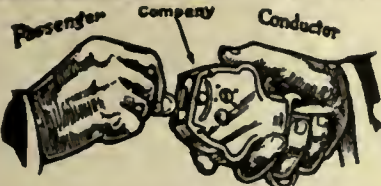
No. **478E**

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

Gets Every Fare
PEREY TURNSTILES or PASSIMETERS
Use them in your Prepayment Areas and Street Cars
Perey Manufacturing Co., Inc.
101 Park Avenue, New York City



Passenger Company Conductor



Direct Automatic Registration
By the **Passengers**
Rooke Automatic Register Co.
Providence, R. I.


PS HEATERS

Car Heating and Ventilation
are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

PANELYTE

Electrical Insulation and Headlinings
THE PANELYTE COMPANY, Trenton, N. J.



You're having brush trouble

CORRECT IT
USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

W. J. Jeandron
345 Madison Avenue, New York
Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd.,
Montreal and Toronto

BRAKE SHOES
AERA Standards
Brake Heads



Diamond "S" Steel Back and Lug Shoes
best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago



"Differential Two-Car Train. Trailer dumping load clear of trench."

DIFFERENTIAL CARS

Standard on Fifty Railways for

Track Maintenance	Track Construction
Ash Disposal	Hauling Crossties
Placing Ballast	Disposal of Waste
Coal Hauling	Snow Disposal
Concrete Materials to the Job	
Excavated Material to the Dump	

For Economy

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION
CAR-WHEEL TRUCK and TRACTOR

THE DIFFERENTIAL STEEL CAR CO.

Findlay, Ohio, U. S. A.



Cold Dinners

for *your* passengers?

Not if you use

AJAX

BABBITT for ARMATURES

keeps the rolling stock rolling



The Ajax Metal Company

Established 1880

PHILADELPHIA

NEW YORK

CHICAGO

BOSTON

CLEVELAND

"Tool Steel"

HELICALS

are just as superior
in quality as

"Tool Steel"

SPURS.

Tool Steel Quality

The Tool Steel
Gear and Pinion Co.

CINCINNATI, O.

Helical gears licensed under patent May 29th, 1923

Waterproofed Trolley Cord



Is the finest cord that science and skill can produce.
Its wearing qualities are unsurpassed.

**FOR POSITIVE SATISFACTION ORDER
SILVER LAKE**

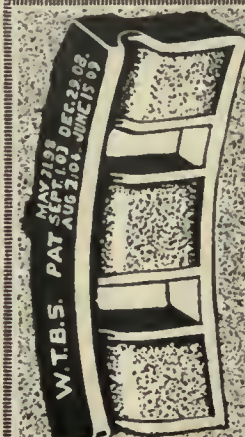
If you are not familiar with the quality you will be
surprised at its **ENDURANCE** and **ECONOMY**.

Sold by Net Weights and Fall Lengths

SILVER LAKE COMPANY

Manufacturers of bell, signal and other cords.

Newtonville, Massachusetts



**Defective Wheels
Corrected While They Run**

WHEEL TRUING BRAKE SHOES

—keep your cars and wheels in
service. Abrasive blocks in vari-
ous sections correct flattening or
wear on any part of flange or
tread. Write for booklet.

Wheel Truing Brake Shoe Co.
Detroit, Mich.

Trade Mark—Wheel Truing Brake
Shoe

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD.

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.
Positions Vacant and all other classifications, 8 cents a word, minimum charge \$2.00.
Proposals, 40 cents a line an insertion.

INFORMATION.

Box Numbers in care of any of our office count 10 words additional in undisplayed ads.
Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH

1 to 3 inches . . . \$1.50 an inch
4 to 7 inches . . . 4.30 an inch
8 to 11 inches . . . 4.10 an inch
Rates for large space, or yearly rates, on request.
An advertising card is measured vertically in one column, 3 columns 10 inch—4 space

POSITIONS WANTED

AUDITOR, broad and thorough experience in financing and accounting; all branches railway, electric and gas utilities, open for engagement. Possesses initiative and capable of assuming full control of all accounting matters. PW-753, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

EXECUTIVE, nine years manager of local street railway system in industrial town seeks larger opportunity. Thirteen years' prior experience in engineering, transportation and executive departments of large trunk line railroad. Has given special study to analyzing transportation problems and operating costs. PW-761, Electric Railway Journal, Real Estate Trust Bldg., Philadelphia, Pa.

EXECUTIVE—Twelve years' experience in engineering and operation, city and interurban; first-class record and references. PW-757, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

EXECUTIVE. Urban and interurban. Wide successful experience in all departments of construction and operation. PW-740, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

GENERAL superintendent of one of the largest electric railway systems, interurban and city, desires a change. Has come up through the ranks. Knows both electric railway and bus business. Capable of handling combination property. Highest references furnished confidentially. Open to any stable proposition. Wide experience with men in all departments of the business. If interested please give me an interview. Address PW-764, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

GENERAL shop foreman, city or interurban, 18 years' successful experience in maintenance operation and general shop management. At present employed. Personal reasons for change. PW-767, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

GENERAL superintendent, chief engineer, or superintendent of equipment, technical graduate, eighteen years' experience on construction, operation, maintenance of power, shops, track, line buses. Highly successful in handling men and materials and producing results, fine references. Personal reasons for desiring change. PW-768, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITION wanted by young man, thorough accountant, ten years' public utility experience middle west, six years as auditor, secretary and treasurer and assistant to manager; familiar with railway, bus, gas and electric departments. Now employed, but desire change. PW-766, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

WANTED: Position with street railway company by master mechanic, 18 years' experience. Best of references. PW-765, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

WANTED

Order for Oak, Car Stock, Cross Ties, Switch Ties, Timber. Have four mills in operation. A good stand of timber, grades guaranteed. Prices right. Let's get acquainted.

ENARO LUMBER MFG. CO.
411 Aouw Bldg., Little Rock, Ark.

FOR SALE

Two Single Truck Snow Sweepers

Complete
Ready for operation
Splendid condition
Transit Equipment Co.

Cars — Motors
501 Fifth Avenue, New York

UNUSUAL 70 LB.

RAILS

ASCE Section—Low Prices

ZELNICKER IN ST. LOUIS

Steel Piling—Cars—Track Material, Etc.

Relaying Rails

NEW RAILS—ACCESSORIES

See our full page
announcement on
page 76.

1 Ton or 1000



PITTSBURGH, PA. — NEW YORK CITY
JERSEY CITY — PHILADELPHIA — HAMILTON, O.

WE WANT TO BUY

30—West. 300-C.V.-4

MOTORS

Have you any to offer?

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

The Searchlight Advertising in This Paper

is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

The Best Proof

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable demand for such machinery or services, by its readers, the market-place which these advertisements represent could not exist for any length of time.

Are you using the Searchlight Section?

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

- Advertising, Street Car**
Collier, Inc., Barron G.
- Air Circuit Breakers**
Roller-Smith Co.
- Air Receivers, Aftercoolers**
Ingersoll-Rand Co.
- Ammeters**
Roller-Smith Co.
Weston Electrical Instrument Co.
- Anchors, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
- Armature Shop Tools**
Elec. Service Supplies Co.
- Automatic Return Switch Stand**
Ramapo Ajax Corp.
- Automatic Safety Switch Stands**
Ramapo Ajax Corp.
- Axles**
Bemis Car Truck Co.
Johnson & Co., J. E.
St. Louis Car Co.
Standard Steel Wks.
Taylor Elec. Truck Co.
- Axles, Bus**
Standard Steel Co.
- Axles (Front & Rear) Motor Truck & Passenger Car**
Timken-Detroit Axle Co.
- Axle Straighteners**
Columbia M. W. & M. I. Co.
- Axles, Trailer & Motor Bus**
Timken-Detroit Axle Co.
- Axles, Car Wheel**
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. E.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
- Babbitt Metal**
Ajax Metal Co.
- Babbitt Devices**
Columbia Machine Wks.
- Badges and Buttons**
Elec. Service Supplies Co.
International Register Co.
The
- Batteries, Dry**
National Carbon Co.
Nichols-Lintern Co.
- Bearings and Bearing Metals**
Ajax Metal Co.
Bemis Car Truck Co.
Columbia Machine Wks.
General Electric Co.
More-Jones Brass & Metal Co.
Norma-Hoffman Corp.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
- Bearings, Center and Roller Side**
Baldwin Locomotive Wks.
Norma-Hoffman Corp.
Stucki Co., A.
- Bells and Gongs**
Brill Co., The J. G.
Columbia Machine Wks.
Consolidated Car Heating Co.
Elec. Service Supplies Co.
- Benders, Rail**
Railway Track-work Co.
- Bodies, Bus**
Superior Motor Coach Body Co.
Auto Body Co.
- Bollers**
Babcock & Wilcox Co., The
- Bond Testers**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Roller-Smith Co.
- Bonding Apparatus**
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
Ronds, Hall
- Book Publishers**
McGraw-Hill Book Co.
- Boxes, Switch**
Johas-Pratt Co.
- Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)**
American Bridge Co.
Bates Expanded Steel Truss Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
- Brake Adjusters**
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.
- Brake Shoes**
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.
- Brakes, Brake Systems and Brake Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia Machine Wks.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.
- Brooms, Track, Steel or Rattan**
Parson Co., J. W.
- Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co.
National Carbon Co.
Westinghouse Elec. & M. Co.
- Brushes, Graphite**
Morganite Brush Co.
National Carbon Co.
- Brush Holders**
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
- Brushes, Wire Pneumatic**
Ingersoll-Rand Co.
- Bulkheads**
Haskelite Mfg. Co.
- Bankers, Coal**
American Bridge Co.
- Buses, Motor**
Brill Co., The J. G.
International Harvester Co.
International Motor Co.
N. Y. Transportation Co.
Pierce-Arrow Motor Car Co.
St. Louis Car Co.
Six Wheel Co.
White Co.
- Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.
E. G. Long Co.
- Cables**
(See Wires and Cables)
- Calculating Machines**
W. A. Morschhauser
- Cambric Tapes, Yellow & Black Varnish**
Irvington Varnish & Ins. Co.
- Cambric Yellow & Black Varnish**
Mica Insulator Co.
- Carbon Brushes**
(See Brushes, Carbon)
- Car Flooring**
Wheeling Corrugated Co.
- Car Lighting Apparatus**
Elec. Service Supplies Co.
- Car Panel Safety Switches**
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.
- Car Steps, Safety**
Irving Iron Wks.
- Car Wheels, Rolled Steel**
Bethlehem Steel Co.
- Cars, Dump**
Differential Steel Car Co., Inc.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
- Cars, Gas Rail**
St. Louis Car Co.
- Cars, Passenger, Freight Express, etc.**
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Thomas Car Wks., Perley A. Wason Mfg. Co.
- Cars, Second Hand**
Electric Equipment Co.
Transit Equipment Co.
- Cars, Self-Propelled**
General Electric Co.
- Castings, Brass, Composition or Copper**
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia Machine Wks.
More-Jones Brass & Metal Co.
- Castings, Funnel**
Wharton, Jr. & Co., Inc., Wm.
- Castings, Gray Iron and Steel**
American Bridge Co.
Bemis Car Truck Co.
Columbia Machine Wks.
Standard Steel Wks.
- Castings, Malleable and Brass**
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia Machine Wks.
- Catchers and Retrievers, Trolley**
Earl, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
- Catenary Construction**
Archbold-Brady Co.
- Cement Products**
Atlas Lumnite Co.
- Change Carriers**
Cleveland Fare Box Co.
Galef, J. L.
- Circuit Breakers**
General Electric Co.
Roller-Smith Co.
Westinghouse Elec. & M. Co.
- Clamps and Connectors for Wires and Cables**
Anderson Mfg. Co., A. M. & J. M.
Dessert & Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Westinghouse Elec. & M. Co.
- Cleaners and Scrapers, Track**
(See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
Ohio Brass Co.
Root Spring Scraper Co.
- Clinsters and Sockets**
General Electric Co.
- Coal and Ash Handling**
(See Conveying and Hoisting Machinery)
- Coils, Armature and Field**
Columbia Machine Wks.
Economy Electric Devices Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Coil Banding and Winding Machines**
Columbia Machine Wks.
Electric Service Sup. Co.
Westinghouse Elec. & M. Co.
- Coils, Choke and Kieking**
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Coin-Counting Machines**
Cleveland Fare Box Co.
Galef, J. L.
International Register Co.
The
Johnson Fare Box Co.
- Coin Sorting Machines**
Cleveland Fare Box Co.
Galef, J. L.
- Coin Wrappers**
Cleveland Fare Box Co.
Galef, J. L.
- Commutator Slotters**
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Commutator Truing Devices**
General Electric Co.
- Commutators or Parts**
Cameron Elec'l Mfg. Co.
Columbia Machine Wks.
General Electric Co.
Westinghouse Elec. & M. Co.
- Compressors, Air**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
- Compressors, Air, Portable**
Ingersoll-Rand Co.
- Compressors, Gas**
Ingersoll-Rand Co.
- Concrete Flooring Surface**
Irving Iron Works
- Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.
- Condenser Papers**
Irvington Varnish & Ins. Co.
- Conduits, Underground**
Std. Underground Cable Co.
- Connectors, Solderless**
Dessert & Co.
Frankel Connector Co.
Westinghouse Elec. & M. Co.
- Connectors, Trailer Car**
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.
- Controllers or Parts**
Allis-Chalmers Mfg. Co.
Columbia Machine Wks.
General Electric Co.
Westinghouse Elec. & M. Co.
- Controller Regulators**
Electric Service Supplies Co.
- Controlling Systems**
General Electric Co.
Westinghouse Elec. & M. Co.
- Converters, Rotary**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Conveying and Hoisting Machinery**
Columbia M. W. & M. I. Co.
- Copper Wire**
Anaconda Copper Mining Co.
- Cord, Bell, Trolley, Register, etc.**
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebblings Sons Co., John A.
Samson Cordage Works
Silver Lake Co.
- Cord Connectors and Couplers**
Electric Service Supplies Co.
Samson Cordage Work
Wood Co., Chas. N.
- Couplers, Car**
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Cranes**
Allis-Chalmers Mfg. Co.
- Cross Arms (See Brackets)**
Ramapo Ajax Corp.
- Crossing Foundations**
International Steel Tie Co.
- Crossing Frogs and Switches**
Ramapo Ajax Corp.
Wm. Wharton Jr. & Co., Inc.
- Crossings, Manganese**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Crossing Signals (See Signal Systems, Highway Crossing)**
- Crossings, Track, (See Track, Special Work)**
- Crossings, Trolley**
Ohio Brass Co.
- Crushers, Rock**
Allis-Chalmers Mfg. Co.
- Curtains and Curtain Fixtures**
Brill Co., The J. G.
Electric Service Supplies Co.
Morton Mfg. Co.
- Outlets**
Johns Pratt Co.
- Dealers' Machinery**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.
- Derailing Switches, Tss Rail**
Ramapo Ajax Corp.
- Destination Signs**
Columbia Machine Wks.
Electric Service Supplies Co.
- Detective Service**
Wish Service, P. Edward
- Door Operating Devices**
Consolidated Car Heating Co.
National Pneu. Co. Inc.
Safety Car Devices Co.
- Doors and Door Fixtures**
Brill Co., The J. G.
General Electric Co.
Hale-Kilburn Co.
St. Louis Car Co.
- Doors, Folding Vestibule**
National Pneumatic Co., Inc.
- Draft Rigging, (See Couplers)**
- Drills, Track**
American Steel & Wire Co.
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.
- Dryers, Sand**
Electric Service Supplies Co.
- Fans**
Ohio Brass Co.
- Economizers**
Power Specialty Co.
- Electric Grinders**
Railway Track-work Co.
- Electrodes, Carbon**
Railway Track-work Co.



Ingersoll-Rand Paving Breakers tearing up track foundation operated from I-R Electric Driven Portable Air Compressor.

A dozen times faster

The Compressed Air Way Saves Time and Money

Ingersoll - Rand Portable Air Compressors and Tools finish up many jobs in a fraction of the time required by hand methods.

Pneumatic "Paving Breakers" save more than 50% in time and labor over hand methods, when breaking out pavement shoulders, heavy foundation, etc.

Pneumatic Tie Tampers enable four men to tamp more track and do it better than twelve to sixteen men using hand methods.

Other air tools are also used to save money on various jobs, making the portable compressor outfit a most important factor in reducing track costs. Ask for complete information on the savings made with portable air power units.

Ingersoll-Rand Company
 11 Broadway, New York
 Offices in the Principal Cities the World Over
 For Canada, refer Canadian Ingersoll-Rand Co., Limited
 260 St. James Street, Montreal, Quebec

Ingersoll-Rand

- Electrodes, Steel**
Railway Track-work Co.
- Electrical Wires and Cables**
American Elec. Works
Roebblings Sons Co., J. A.
- Engineers, Consulting, Con-
tracting and Operating**
Allison & Co., J. E.
Archbold-Brady Co.
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layne
Bureau of Commercial
Economics, Inc.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly, Cooke & Co.
Ong, Joe R.
Parsons, Klapp, Brinkerhoff
& Douglas
Railway Audit & Inspection
Co.
Richey, Albert S.
Dwight P. Robinson & Co.
Sanderson & Porter
Shaw, Henry M.
Stevens & Wood, Inc.
Stone & Webster
- Engineers Inspecting &
Chemists**
Pittsburgh Testing
Laboratory
- Engines, Gas, Oil and Steam**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.
- Expansion Joints, Track**
Wharton, Jr., & Co., Inc.,
Wm.
- Exterior Side Panels**
Haskellite Mfg. Co.
- Fare Boxes**
Cleveland Fare Box Co.
Economy Elec. Devices Co.
Galef, J. L.
Nat'l Ry. Appliance Co.
Ohmer Fare Register Co.
- Fences, Woven Wire and
Fence Posts**
Amer. Steel & Wire Co.
- Fenders and Wheel Guards**
Brill Co., The J. G.
Consolidated Car Fender Co.
Electric Service Sup. Co.
Root Spring Scraper Co.
Star Brass Works
- Fibre and Fibre Tubing**
Westinghouse Elec. & M. Co.
- Field Colla (See Colla)**
- Flaxlinum Insulation**
Nat'l Ry. Appliance Co.
- Fluorlights**
Electric Service Sup. Co.
- Floor Plates**
American Abrasive Metals
Co.
- Flooring, Fireproof**
Irving Iron Works
- Flooring, Non-Slipping**
Irving Iron Works
- Flooring, Open Steel**
Irving Iron Works
- Flooring, Steel Subway**
Irving Iron Works
- Flooring, Ventilating**
Irving Iron Works
- Forgings**
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Duff Mfg. Co.
Standard Steel Wks.
- Frogs & Crossings, Tee Rail**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Frogs, Track. (See Track
Work)**
- Frogs, Trolley**
Ohio Brass Co.
- Funnel Castings**
Wm. Wharton Jr. & Co.
- Furnaces, Electric**
American Bridge Co.
- Fuses and Fuse Boxes**
Columbia Machine Wks.
Consolidated Car Heating
Co.
- General Electric Co.**
Westinghouse Elec. & M. Co.
- Fuses, Refillable**
General Electric Co.
- Galvanizers, Hot Dip**
Jos. P. Catlin & Bros.
- Gaskets**
Westinghouse Tr. Br. Co.
- Gas-Electric Cars**
General Electric Co.
- Gasoline Torches**
Economy Elec. Devices Co.
- Gas Producers**
Westinghouse Elec. & M. Co.
- Galvanometers**
Weston Electrical Instru-
ment Co.
- Gates, Car**
Brill Co., The J. G.
- Gear Blanks**
Bethlehem Steel Co.
Carnegie Steel Co.
Standard Steel Wks.
- Gear Cases**
Chillingworth Mfg. Co.
Columbia Machine Wks.
Electric Service Supplies Co.
Westinghouse Elec. & M. Co.
- Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Columbia Machine Wks.
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion
Co.
- Generating Sets, Gas-Electric**
General Electric Co.
- Generators**
Allis-Chalmers Mfg. Co.
English Electric Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Girders Rails**
Bethlehem Steel Co.
Lorain Steel Co., The
- Gongs (See Bells and Gongs)**
- Grating, Steel Subway**
Irving Iron Works
- Grenases (See Lubricants)**
- Grinders and Grinding
Supplies**
Metal & Thermit Corp.
Railway Track-work Co.
- Grinders, Portable**
Railway Track-work Co.
- Grinders, Portable Electric**
Railway Track-work Co.
- Grinding Blocks and Wheels**
Railway Track-work Co.
- Guard Rail Clamps**
Ramapo Ajax Corp.
- Guard Rails, Tee Rail &
Manganese**
Ramapo Ajax Corp.
- Guards, Cattle**
American Bridge Co.
- Guards, Trolley**
Electric Service Sup. Co.
Ohio Brass Co.
- Hammers, Pneumatic**
Ingersoll-Rand Co.
- Harps, Trolley**
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
More-Jones Brass & Metal
Co.
Nuttall Co., R. D.
- Headlights**
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
- Headlining**
Haskellite Mfg. Co.
Panelyte Co.
- Heaters, Car (Electric)**
Consolidated Car Heating
Co.
Gold Car Heating & Light-
ing Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter
- Heaters, Car, Hot Air and
Water**
Electric Service Sup. Co.
Smith Heater Co., Peter
Wm.
- Heaters for Special Purposes**
Power Specialty Co.
- Helmets, Welding**
Railway Track-work Co.
- Holts and Lifts**
Columbia Machine Wks.
- Holts, Portable**
Ingersoll-Rand Co.
- Hose, Bridge**
Ohio Brass Co.
- Hydraulic Machinery**
Allis-Chalmers Mfg. Co.
- Indicating, Signals**
Nichols-Lintern Co.
- Inspecting Engineers &
Chemists**
Pittsburgh Testing Labora-
tory
- Instruments, Measuring, Test-
ing and Recording**
Electric Service Sup. Co.
General Electric Co.
Roller-Smith Co.
Westinghouse Elec. & M. Co.
Weston Electrical Instru-
ment Corp.
- Insulating Cloth, Paper and
Tape**
Anchor Webbing Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Standard Underground
Cable Co.
Westinghouse E. & M. Co.
- Insulating Machinery**
Amer. Ins. Machinery Co.
- Insulating Silk**
Irvington Varnish & Ins. Co.
- Insulating Varnishes**
Irvington Varnish & Ins. Co.
- Insulation (See also Paints)**
Anderson M. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Westinghouse Elec. & M. Co.
- Insulation Cloth Paper &
Tape**
Mitchell-Rand Co.
Mica Insulator Co.
- Insulation, Slot**
Irvington Varnish & Ins. Co.
- Insulator Pias**
Electric Service Sup. Co.
Hubbard & Co.
- Insulators (See also Line
Material)**
Anderson M. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
Hemingray Glass Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
- Jacks (See also Holts and
Lifts)**
Buda Company
Columbia Machine Wks.
Duff Mfg. Co.
Electric Service Sup. Co.
National Ry. Appliance Co.
- Journal Boxes**
Bemis Car Truck Co.
Brill Co., The J. G.
- Junction Boxes**
Standard Underground
Cable Co.
- Lamp Guards and Fixtures**
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Signal and Marker**
Nichols-Lintern Co.
- Lanterns, Classification**
Nichols-Lintern Co.
- Lightning Arrestors**
Shaw, Henry M.
- Lightning Protection**
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
- Line Material (See also
Brackets, Insulators, Wires,
Etc.)**
Anderson M. Co., A. & J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Dossert & Co.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
English Electric Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Westinghouse Elec. & M. Co.
- Locking Spring Boxes**
Wm. Wharton Jr. & Co., Inc.
- Locomotives, Electric**
Baldwin Locomotive Wks.
General Electric Co.
Westinghouse Elec. & M. Co.
- Locomotives, Oil Engiae,
Electric Driven**
Ingersoll-Rand Co.
- Lubricating Engineers**
Galena-Signal Oil Co.
Texas Company
Universal Lubricating Co.
- Lubricants, Oil and Grease**
Galena Signal Oil Co.
Texas Company
Universal Lubricating Co.
- Lumber (See Poles, Ties,
etc.)**
- Machine Tools**
Columbia M. W. & M. I. Co.
- Manganese Parts**
Bemis Car Truck Co.
- Manganese Steel Castings**
Wm. Wharton Jr. & Co., Inc.
- Manganese Steel Guard Rails**
Ramapo Ajax Corp.
- Manganese Steel, Special
Track Work**
Bethlehem Steel Co.
Wm. Wharton Jr. & Co., Inc.
- Manganese Steel Switches,
Frogs and Crossings**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Meters (See Instruments)**
Roller-Smith Co.
- Meters, Car Watt-Hour**
Economy Electric Devices Co.
- Mica**
Mica Insulator Co.
- Motor and Generator Sets**
General Electric Co.
- Motor Buses
(See Buses, Motor)**
- Motormen's Seals**
Brill Co., The J. G.
Electric Service Sup. Co.
St. Louis Car Co.
Wood Co., Chas. N.
- Motors, Electric**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Motor Lends**
Dossert & Co.
- Nuts and Bolts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Bethlehem Steel Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.
- Ohmmeters**
Roller-Smith Co.
- Oil Heaters**
Power Specialty Co.
- Oil Purifiers**
De Laval Separator Co.
- Oils (See Lubricants)**
- Packing**
Electric Service Sup. Co.
Westinghouse Tr. Br. Co.
- Paints and Varnish Preserva-
tives**
Baldwin Locomotive Wks.
Joseph Dixon Crucible Co.
- Paints and Varnishes for
Woodwork**
National Ry. Appliance Co.
- Pavement Breakers**
Ingersoll-Rand Co.
- Paving Material**
Amer. Br. Shoe & Fdry. Co.
- Pickups, Trolley Wire**
Electric Service Sup. Co.
Ohio Brass Co.
- Pinion Rollers**
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
General Electric Co.
Wood Co., Chas. N.
- Pinions (See Gears)**
- Pins, Case Hardened, Wood
and Iron**
Bemis Car Truck Co.
Electric Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Pipe Fittings**
Standard Steel Wks.
- Planers (See Machine Tools)**
- Plates for Tee Rail Switches**
Ramapo Ajax Corp.
- Pilers, Rubber Insulated**
Electric Service Sup. Co.
- Pneumatic Tools and
Accessories**
Ingersoll-Rand Co.
- Pole Line Hardware**
Bethlehem Steel Co.
Ohio Brass Co.
- Pole Reinforcing**
Draw Elec. & Mfg. Co.
Hubbard & Co.
- Poles and Ties, Treated**
Bell Lumber Co.
Cook Pole & Tie Co.
International Creosoting &
Construction Co.
Long Bell Lumber Co.
- Poles, Metal Steel**
Bates Expanded Steel Truss
Co.
Electric Ry. Equip. Co.
Hubbard & Co.
- Poles, Ties, Posts, Piling and
Lumber**
Bell Lumber Co.
Cook Pole & Tie Co.
International Creosoting &
Construction Co.
Long Bell Lumber Co.
- Poles, Trolley**
Anderson M. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Nuttall Co., R. D.
- Poles, Tubular Steel**
Elec. Ry. Equip. Co.
Electric Service Sup. Co.
- Portable Grinders**
Buda Company
- Potholes**
Okonite Co.
- Power Saving Devices**
Nat'l Ry. Appliance Co.
- Pressure Regulators**
General Electric Co.
Westinghouse Elec. & M. Co.
- Pumps**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
- Pumps, Vennum**
Ingersoll-Rand Co.
- Punches, Ticket**
International Register Co.,
The
Wood Co., Chas. N.
- Rail Braces and Fastenings**
Ramapo Ajax Corp.
- Rail Joints**
Carnegie Steel Co.
Rail Joint Co.
- Rail Joints, Welded**
Metal & Thermit Corp.
- Rail Grinders (See Grinders)**

BRUSHES THAT HAVE BECOME THE TRADITION IN TRACTION



402

GRADE 402 has been proved by test the most economical and satisfactory brush in both city and interurban service, for standard interpole railway motors with slotted commutators.

Our Sales Engineers
are eager to serve you.

National Pyramid Brushes

Manufactured and guaranteed by

NATIONAL CARBON CO., INC., Cleveland, Ohio—San Francisco, Cal.
Canadian National Carbon Co., Limited, Toronto, Ontario

Emergency Service Plants

CHICAGO, ILL.
551 Monroe St.
Phone: STAtc 6092

PITTSBURGH, PA.
7th Floor, Arrott Power Bldg. No. 3, Barker Place
Phone: SMithfield 0740

NEW YORK, N. Y.
237 East 41st St.
Phone: VANderbilt 0425

- Rails, Relaying**
L. B. Foster Co.
Hyman-Michaels Co.
- Rails, Steel**
Carnegie Steel Co.
L. B. Foster Co.
- Railway Safety Switches**
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.
- Railway Welding (See Welding Processes)**
- Rail Welding**
Metal & Thermit Corp.
- Railroad**
Brill Co., The J. G.
Electric Service Sup. Co.
Hale-Kilburn Co.
St. Louis Car Co.
- Registers and Fittings**
Brill Co., The J. G.
Electric Service Sup. Co.
International Reg. Co., The
Ohmer Fare Register Co.
Krooke Automatic Reg. Co.
- Reinforcement, Concrete**
Amer. Steel & Wire Co.
Bethlehem Steel Co.
Carnegie Steel Co.
- Repair Shop Appliances (See also Coll. Handling and Winding Machines)**
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
- Repair Work (See also Colls.)**
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Replacers, Car**
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
- Resistance, Grid**
Columbia M. W. & M. I. Co.
Monitor Controller Co.
- Resistance, Wire and Tube**
General Electric Co.
Westinghouse Elec. & M. Co.
- Resistances**
Consolidated Car Heating Co.
- Retrievers, Trolley (See Catchers and Retrievers, Trolley)**
- Rheostats**
General Electric Co.
Monitor Controller Co.
Westinghouse Elec. & M. Co.
- Rollers, Bearing**
Hyatt Roller Bearing Co.
- Roofs**
Haskelite Mfg. Co.
- Sanders, Track**
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
- Sash Fixtures, Car**
Brill Co., The J. G.
- Sash, Metal, Car Window**
Hale-Kilburn Co.
- Scrapers, Track (See Cleaners and Scrapers, Track)**
- Screw Drivers, Rubber Insulated**
Electric Service Sup. Co.
- Seating Materials**
Brill Co., The J. G.
- Seats, Bus**
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.
- Seats, Car (See also Raitan)**
Brill Co., The J. G.
Hale-Kilburn Co.
St. Louis Car Co.
- Second-Hand Equipment**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.
Zellicker Supply Co., W. A.
- Shades, Vestibule**
Brill Co., The J. G.
- Shovels**
Hubbard & Co.
- Shovels, Power**
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.
- Signals, Car Starting**
Consolidated Car Heating Co.
Electric Service Sup. Co.
Nat'l Pneumatic Co., Inc.
- Signals, Indicating**
Nichols-Lintern Co.
- Signal Systems, Block**
Electric Service Sup. Co.
Nashod Signal Co., Inc.
Union Switch & Signal Co.
U. S. Electric Signal Co.
Wood Co., Chas. N.
- Signal Systems, Highway Crossing**
Nashod Signal Co., Inc.
U. S. Electric Signal Co.
- Slack Adjusters (See Brake Adjusters)**
- Slag**
Carnegie Steel Co.
- Steel Wheels and Cotters**
Anderson M. Co., A. & J. M.
Columbia Machine Wks.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
- Smokestacks, Car**
Nichols-Lintern Co.
- Snow-Plows, Sweepers and Brooms**
Brill Co., The J. G.
Columbia Machine Wks.
Consolidated Car Heating Co.
- Soldering and Brazing (See Welding Processes and Apparatus)**
- Spikes**
Amer. Steel & Wire Co.
- Special Adhesive Papers**
Irvington Varnish & Ins. Co.
- Special Trackwork**
Bethlehem Steel Co.
Lorain Steel Co., The
- Splicing Compounds**
Westinghouse Elec. & M. Co.
- Splicing Sleeves (See Clamps and Connectors)**
- Springs, Car and Truck**
Bemis Car Truck Co.
Brill Co., The J. G.
Ft. Pitt Spring & Mfg. Co.
St. Louis Car Co.
Standard Steel Wks.
Taylor Electric Truck Co.
- Sprinklers, Track and Road**
Brill Co., The J. G.
- Stair Steps, Safety**
Irving Iron Works
- Steel Castings**
Wm. Wharton Jr. & Co., Inc.
- Steel and Steel Products**
Morton Mfg. Co.
- Steps, Car**
American Abrasive Metals Co.
Morton Mfg. Co.
- Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse Elec. & M. Co.
- Storage Batteries (See Batteries, Storage)**
- Strain Insulators**
Ohio Brass Co.
- Strand**
Roebbing's Sons Co., J. A.
- Superheaters**
Babcock & Wilcox Co.
Power Specialty Co.
- Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**
- Switch Stands**
Ramapo Ajax Corp.
- Switches and Switchboards**
Allis-Chalmers Mfg. Co.
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Switches, Selector**
Nichols-Lintern Co.
- Switches, Toe Rail**
Ramapo Ajax Corp.
- Switches, Track (See Track Special Work)**
- Synchroscope**
Roller-Smith Co.
- Tampers, Tie**
Ingersoll-Rand Co.
Railway Track-work Co.
- Tapes and Cloths (See Insulating Cloth, Paper and Tape)**
- Tee Rail, Special Track Work**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Telephones and Parts**
Electric Service Sup. Co.
- Terminals, Cable**
Standard-Underground Cable Co.
- Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**
- Thermostats**
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter
- Ticket Choppers and Destroyers**
Electric Service Sup. Co.
- Tickets and Transfers**
Globe Ticket Co.
- Ties, Mechanical**
Dayton Mechanical Tie Co.
- Ties and Tie Rods, Steel**
American Bridge Co.
Carnegie Steel Co.
International Steel Tie Co.
- Ties, Wood Cross (See Pole Ties, Posts, etc.)**
- Tokens**
Scovill Mfg. Co.
- Tongue Switches**
Wm. Wharton Jr. & Co.
- Tool Steel**
Bethlehem Steel Co.
Carnegie Steel Co.
- Tools, Track and Misc.**
Amer. Steel & Wire Co.
Columbia Machine Wks.
Electric Service Sup. Co.
Hubbard & Co.
Railway Track-work Co.
- Tower Wagons and Auto Trucks**
McCardell & Co., J. R.
- Towers and Transmission Structures**
Archbold-Brady Co.
Bates Expanded Steel Truss Co.
Westinghouse Elec. & M. Co.
- Track Expansion Joints**
Wm. Wharton Jr. & Co.
- Track Grinders**
Metal & Thermit Corp.
Railway Track-work Co.
- Trackless Trolleys**
Pierce-Arrow Motor Car Co.
St. Louis Car Co.
- Track, Special Work**
Bethlehem Steel Co.
Buda Company
Columbia Machine Wks.
N. Y. Switch & Crossing Co.
Ramapo Ajax Corp.
Wharton, Jr. & Co., Inc., Wm.
- Transfer Issuing Machines**
Ohmer Fare Register Co.
- Transfer Tables**
American Bridge Co.
- Transformers**
Allis-Chalmers Mfg. Co.
American Transformer Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Transmission Towers & Structures**
Amer. Bridge Co.
- Treads, Safety, Stair, Car Step**
American Abrasive Metals Co.
Morton Mfg. Co.
- Trolley Bases**
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Ohio Brass Co.
- Trolley Bases, Relieving**
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Ohio Brass Co.
- Trolley Buses**
Brill Co., The J. G.
General Electric Co.
Westinghouse Elec. & M. Co.
- Trolley Materials**
Electric Service Sup. Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
- Trolley Shoes**
Economy Elec. Devices Co.
Miller Trolley Shoe Co.
- Trolley Wheels (See Wheel, Trolley)**
- Trolley Wheels, Bushings**
More-Jones Brass & Metal Co.
- Trolley Wheels & Harps**
More-Jones Brass & Metal Co.
- Trolley Wire**
American Elec'l Works
Amer. Steel & Wire Co.
Anaconda Copper Mining Co.
Bridgeport Brass Co.
Roebbing's Sons Co., J. A.
- Trucks, Car**
Baldwin Locomotive Wks.
Brill Co., The J. G.
Bemis Car Truck Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
- Tubing, Yellow & Black Flexible Varnishes**
Irvington Varnish & Ins. Co.
- Turbines, Steam**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Turbine Water**
Allis-Chalmers Mfg. Co.
- Turnstiles**
Electric Service Supplies Co.
Percy Mfg. Co., Inc.
- Vacuum Impregnation**
Allis-Chalmers Mfg. Co.
- Valves**
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Varnished Papers**
Irvington Varnish & Ins. Co.
- Varnish Silks**
Irvington Varnish & Ins. Co.
- Varnishes (See Paints, etc.)**
- Ventilators, Car**
Brill Co., The J. G.
National Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.
- Vestibule Linings**
Haskelite Mfg. Co.
- Voltmeters**
Roller-Smith Co.
- Welded Rail Joints**
Alumino-Thermic Corp.
Electric Ry. Improvement Co.
Metal & Thermit Corp.
Ohio Brass Co.
Railway Track-work Co.
- Welders, Portable Electric**
Electric Ry. Imp. Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
- Welding Processes and Apparatus**
Alumino-Thermic Corp.
Elec. Ry. Improvement Co.
General Electric Co.
Metal & Thermit Corp.
National Ry. Appliance Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse Elec. & M. Co.
- Welding Steel**
Electric Ry. Improvement Co.
Railway Track-work Co.
Wheel Guards (See Fenders and Wheel Guards)
- Wheel Grinders**
Wheel Truing Brake Shoe Co.
- Wheels, Car, Cast Iron**
Asso. of Mfrs. of Chilled Car Wheels
Griffin Wheel Co.
- Wheels, Car Steel & Steel Tire**
Carnegie Steel Co.
Standard Steel Wks.
- Wheel Presses (See Machine Tools)**
- Wheels, Trolley**
Anderson Mfg. Co., A. & J. M.
Columbia Machine Wks.
Electric Ry. Equip. Co.
Elec. Service Supplies Co.
General Electric Co.
Gilbert & Sons, B. F. A.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works
- Whistles, Air**
General Electric Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Wire Rope**
Amer. Steel & Wire Co.
Roebbing's Sons Co., J. A.
- Wires and Cables**
Aluminum Co. of Amer.
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
General Electric Co.
Kerite Insulated Wire & Cable Co.
Okonite Co.
Roebbing's Sons Co., J. A.
Co.
Standard Underground Cable Co.
Westinghouse Elec. & M. Co.
- Wood Preservatives**
Baker Wood Preserving Co.
- Woodworking Machinery**
Allis-Chalmers Mfg. Co.



The Step to Take in Building Cars for the Public's Safety

IRVING

TRADE MARK
SAFKAR

STEP

CAR step accidents are more frequent than most people realize—and smooth, slippery steps are a pretty big risk any time, but especially in rush hours. One damage suit may cost you more than a “SAFKAR” equipment for every car on your tracks.

There's built-in accident insurance in these sturdy steel safety car steps. There's comfort for passengers, too—a secure foothold that makes for quick passenger interchange.

NON-SLIPPING under all conditions, wet or dry—**PERMANENTLY SLIP-PROOF**, no abrasive insets, bars or mats to wear out or work loose—**EXTREMELY LIGHT WEIGHT**—**CLEANLY**, because dust, dirt, mud and snow fall through—**ECONOMICAL AND PRACTICALLY INDESTRUCTIBLE**, because all-steel solidly riveted up, self-contained, time-proof and wear-proof—these, summed up, are the distinctive “SAFKAR” values.

There's a size and style of “SAFKAR” Step for every city or interurban car. Write for Catalog 4A28.

Let Us Work With You

Our engineers will welcome an opportunity to work with yours — submitting “Safkar” Steps for examination and test—cooperating with you in any reasonable way toward greater safety and economy in your car step equipment. Call upon us.

IRVING IRON WORKS CO.
LONG ISLAND CITY, N.Y., U.S.A.

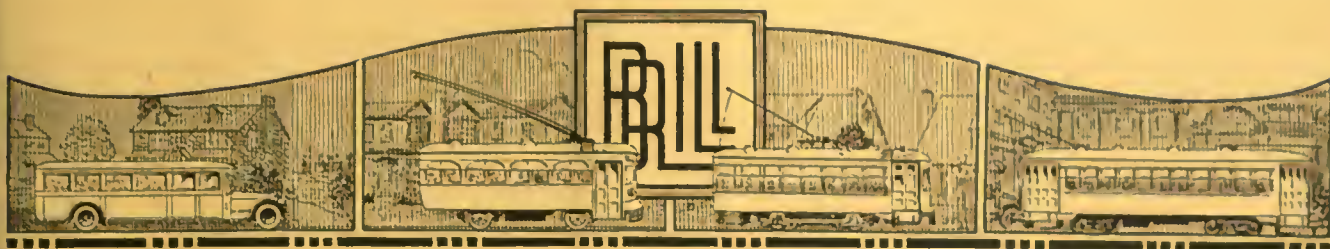
ALPHABETICAL INDEX TO ADVERTISEMENTS

Page		Page		Page		Page	
A							
Ajax Metal Co.....122		Drum & Co., A. L..... 36		Kerite Insulated Wire & Cable		Railway Track-work Co..... 10	
Allis-Chalmers Mfg. Co.....110		Duff Mfg. Co..... 91		Co.....117		Railway Utility Co..... 92	
Allison Co., J. E..... 30			F	Kuhlman Car Co.....131		Ramapo Ajax Co.....113	
Alumina-Thermic Corp. 78						Richey, Albert S..... 36	
Aluminum Co. 82		Earli, C. 1.....113			L	Robinson Co., Dwight P..... 36	
American Abrasive Metals.....111		Economy Electric Devices Co.20, 21		Le Carbone Co. ....121		Roebbing's Sons Co., John A...116	
Amer. Brako Shoe & Fdy. Co..121		Electric Equipment Co.....123		Lightweight Noiseless Electric		Roller-Smith Co.....111	
American Car Co.....131		Electric Ry. Equipment Co.....110		Street Car Co..... 43		Rome Wire Co..... 65	
American Electrical Works.....116		Elec. Ry. Improvement Co.....112		Long, E. G.....110		Rooke Automatic Register Co..121	
Amerlean Insulating Machinery		Electric Service Supplies Co..14, 15		Long Bell Lumber .....109		Root Spring Scraper .....121	
Co. ....114		English Electric Co..... A		Lorain Steel Co.....118			
American Steel & Wire Co....117			F			S	
American Transformer Co.....114		Ford, Bacon & Davis 30			M	St. Louis Car Co.....37, 60-61	
Anaconda Copper Mining Co.... 39		"For Sale" Ads.....123		McCardell & Co., J. R.....119		Safety Car Devices..... 22	
Anchor Webbing Co.....119		Foster Co., Inc., L. B..... 76		McGraw-Hill Book Co.....107		Samson Cordage Works..... 98	
Anderson Mfg. Co., A. & J. M.. 72		Frankel Connector Co..... 44		McGuire-Cummings Mfg. Co..106		Sanderson & Porter..... 36	
Archbold-Brady Co. 37			G	Metal & Thermit Corp..... 73		Scovill Mfg. Co.....120	
Asso. of Mfrs. of Chilled Car		Galef, J. L.....120		Mica Insulator Co..... 79		Searchlight Section .....123	
Wheels .....103		Galena-Signal Oil Co.....30, 31		Miller Trolley Shoe Co.....28, 29		Six Wheel Co.....52-53	
Atlas Lumnite Cement Co..... 69		General Electric Co.....32-34		Monitor Controller Co.....101		Silver Lake Co.....122	
Auto Body Co..... 54		Globe Ticket Co..... 88		More-Jones Brass & Metal Co.56-57		Smith Heater Co., Peter.....121	
		Gold Car Heating & Ltg. Co.....121		Morganite Brush Co..... 103		Standard Steel Co.....102	
B		Griffin Wheel Co.....100		Morton Mfg. Co.....121		Standard Underground Cable Co. 116	
Babcock & Wilcox Co.....117			H		N	Star Brass Works 93	
Baldwin Locomotive Works.....104		Hale-Kilburn Co. ....86, 87		Nachod Signal Co..... 70		Stevens & Wood, Inc..... 36	
Bates Expanded Steel Truss Co. 42		Haskel Mfg. Co. ....42, 43		National Brake Co..... 35		Stone & Webster 36	
Beeler, John A..... 36		"Help Wanted" Ads.....123		National Carbon Co.....127		Stuckl Co., A.....130	
Bell Lumber Co.....130		Hemlingray Glass Co.....109		National Pneumatic Co., Inc..16, 17		Superior Motor Coach Body Co. 50	
Bemis Car Truck Co.....94, 95		Hemphill & Wells 36		National Ry. Appliance Co...110			T
Bethlehem Steel Co.....74, 75		Holst, Englehard W..... 36		New York Transportation Co.. 27		Taylor Electric Truck Co.....119	
Bibbins, J. Rowland 36		Horne & Ebling .....117		N. Y. Switch & Crossing Co..118		Texas Co.....80, 81	
Bridgeport Brass Co..... 26		Hubbard & Co..... 38		N. E. Electric Co..... 64		Tinker-Detroit Axle Co..... 58	
Brill Co., The J. G.....131		Hyatt Roller Bearing Co..... 99		Nichols-Lintern Co.....120		Thomas Car Works, Perley A..115	
Buchanan & Layng Corp..... 37		Hyman-Michaels Co.....123		Norma-Hoffman Bearings Corp..105		Tool Steel Gear & Pinion Co..122	
Buda Co..... 71			I	Nuttall Co., R. D.....40-41		Transit Equipment Co.....123	
Bureau of Comm. Economics,		Ingersoll-Rand Co. ....125			O	Truscon Steel Co..... 51	
Inc. 37		International Cro. & Const. Co. 45		Ohio Brass Co..... 11			U
C		International Harvester Co.... 59		Ohmer Fare Register Co.....110		Union Switch & Signal Co..... 46	
Cameron Electrical Mfg. Co....117		International Motor Co.....24, 25		Okonite Co., The.....23, 116		U. S. Electric Signal Co.....116	
Carnegie Steel Co. 68		International Register Co., The.129		Ong, Joe R..... 30		Universal Lubricating Co..... 83	
Cattle & Bros., Joseph P.....119		International Steel Tie Co., The.			P		W
Chillingworth Mfg. Co.....114		12, 13		Panelyte Co.....121		"Want" Ads .....123	
Cleveland Fare Box Co.....120		Irving Iron Works.....129		Parson Co., J. W.....118		Wason Mfg. Co.....131	
Collier, Inc., Barron G.....48, 49		Irvington Varnish & Insulator Co.84		Pierce-Arrow Motor Car Co.... 55		Westinghouse Elec. & Mfg. Co.,	
Columbia Machine Works.....96, 97			J	Perey Mfg. Co., Inc.....121		2, 4-9	
Cook Pole & Tie Co.....118		Jackson, Walter 36		Pittsburgh Testing Laboratory.118		West'gh'se Traction Brake Co.. 18	
Consolidated Car Fender Co.... 19		Jeandron, W. J.....121		Positions Wanted and Vacant..123		Weston Electrical Instrument	
Consolidated Car Heating Co.... 89		Johnson & Co., Inc., J. R.....119		Power Specialty Co.....117		Corp.....112	
Curtain Supply Co.....108		Johnson Fare Box Co..... 90			R	Wharton, Jr. & Co., Inc., Wm.. 66	
D			K			Wheel Truing Brake Shoe Co..122	
Dayton Mechanical Tie Co....62-63		Kelly-Cooke Co..... 36		Rail Joint Co..... 77		White Eng. Corp., The J. G..36, 67	
Day & Zimmermann, Inc..... 37				Railway Audit & Inspection Co. 37		Wish Service, The P. Edw.... 37	
De Laval Separator Co..... 85						Wood Co., Chas. N.....116	
Differential Steel Car Co., The..122							
Dixon Crucible Co., Joseph.....115							
Dossert & Co..... 47							

Northern CEDAR POLES Western
 We guarantee
 all grades of poles; also any butt-treating specifications
BELL LUMBER COMPANY
 Minneapolis, Minn.



**STUCKI
 SIDE
 BEARINGS**
 A. STUCKI CO.
 Oliver Bldg.
 Pittsburgh, Pa.



Trenton & Mercer Co. Trac. Corp.

New City and Suburban Cars

Twenty light-weight, one-man two-man cars of this type were recently built in our Philadelphia Plant for Trenton, N. J. Ten cars include quadruple 25 Hp. motor equipment for city service, and ten are equipped with quadruple 35 Hp. motors for suburban service. Otherwise, the cars

are practically identical, being mounted on Brill 77-E low-level trucks equipped with Brill Twin Swing Links, measure 44 ft. long over platforms, and seat 48 passengers.

The city cars weigh 34,476 lb. and the suburban cars 36,746 lb.

 **THE J. G. BRILL COMPANY** 
PHILADELPHIA, PA.
 AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANFO CO.
 ST. LOUIS, MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.




— and not 150 m.
Another order just received, GE-260's
for 150 equipments with PC-10
and GE-1259's with a total
Control — two-motor equipments
of 648 GE-PC- Control on
with important system.

3/1/24

100 More Equipments for the Interborough

The 100 two-motor GE-260 Equipments with PC-10 double-end Control recently ordered for the Subway Division of the Interborough Rapid Transit Company are duplicates of 398 Equipments which have been in service since 1917.



General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

11-3

The 100 two-motor GE-260 Equipments with PC-10 double-end Control recently ordered for the Subway Division of the Interborough Rapid Transit Company are duplicates of 398 Equipments which have been in service since 1917.



General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

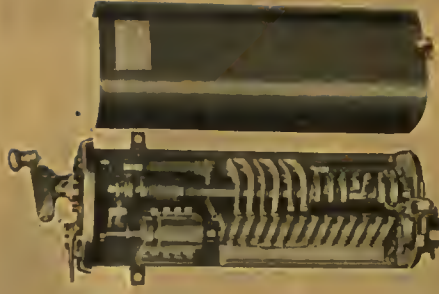
11-3



GE-260 Motor



PC-10 Controller



C-131 Master Controller

HOUSTON PUBLIC LIBRARY
LYCEUM AND CARNEGIE BRANCH
HOUSTON, TEXAS.

ELECTRIC RAILWAY JOURNAL



Public Service purchases 50 more WHITE BUSES

Electric railways continue to show their preference for White Bus equipment for co-ordination with rail service. The Public Service Transportation Co., of Newark, N. J., has just placed an order for 50 more White Model 50-A busses of the pay-enter type to be used in city service. This purchase gives the Public Service Transportation Co. a total of 144 White Busses.

Numerous other electric railways in all sections of the country have profitably co-ordinated bus and rail transportation. The outstanding preference for White equipment is shown by the fact that 37 electric lines are now using 783 White Busses in fleets of five or more. According to a survey made by A.E.R.A. 42 per cent of all the busses operated by electric railways are Whites.

THE WHITE COMPANY
Cleveland

WHITE BUSES

Contributions to Electrification

During 1924



Norfolk & Western Railway.

The Norfolk & Western Railway extended its electrified zone 20 miles during 1924, and placed orders for a further extension of 48 route miles. Four new 414-ton, 4750 hp., 11,000 volts, A-C. Locomotives, consisting of two motive-power units, are now being placed in service.



Pennsylvania Railroad

204.3-ton, 3300 hp., 11,000 volt, A-C. Locomotive. The Pennsylvania Railroad has placed in service three new electric locomotives. Two of these are operating in passenger service on the New York Division, and the third in freight service on the Philadelphia electrified zone.



New York, New Haven & Hartford R. R.

179-ton, 2508 hp., A-C. Passenger Locomotive. To maintain 100% electric service, between New York and New Haven, the N. Y., N. H. & H. R. R. received during 1924 twelve high-speed passenger locomotives. Further extensions to their electrified zone are under way.



Long Island Railroad

54.5-ton, 430 hp., Multiple-Unit Cars. In order to more efficiently handle New York's heavy suburban traffic, The Long Island R. R. is extending its electrification to Babylon, L. I., a distance of approximately twenty miles. Forty additional multiple-unit equipments are on order.



Virginian Railway

The thirty-six, 200-ton, Alternating-Current Motive-Power Units, for operation over the 213 route miles of the Virginian Railways Electrification, are nearing completion. Electric operation will be inaugurated during the coming year.



Detroit & Ironton Railroad

340-ton, 4200 hp., 22,000-volt, Alternating-Current Locomotive. The Motor-Generator Locomotives, a new development in electric-motive power, now under construction at the Ford Motor Company's plant for the Detroit & Ironton Electrification, are expected to be placed in operation the early part of this year.

Westinghouse Electric & Manufacturing Company.
East Pittsburgh, Pennsylvania
Sales Offices in All Principal Cities of the
United States and Foreign Countries.

Westinghouse

MORRIS BUCK
Managing Editor

JOHN A. MILLER, Jr.
Associate Editor

C. W. SQUIER
Associate Editor

O. J. MacMURRAY
News Editor

ELECTRIC RAILWAY JOURNAL

HARRY L. BROWN, Editor

HENRY W. BLAKE
Senior Editor
CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
MERRILL B. KNOX
Editorial Assistant
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

CONTENTS

JANUARY 10, 1925

Editorials	49
I. T. S. Buys Observation Interurban Cars.....	51
Light-weight one-man interurban cars for Illinois Traction System have the main passenger compartment at the front end with smoker and baggage space at the rear. They are arranged for single-end operation, with a back-up device for switching and reversing at terminals.	
Portable Substation Operates at Different Voltages.....	53
Special Bus for Inspection Trips	54
Atlanta Improvements to Cost \$9,000,000.....	55
Changes recommended in Beeler report include rerouting of cars, elimination of jitneys and establishment of bus service by the railway, indexing of streets and construction of new viaducts. Underground moving sidewalks proposed for the business district.	
London Tries New One-Man Car.....	58
Massachusetts Towns Provide Their Own Transportation.....	59
The towns of Athol, Orange, Greenfield and Montague take over lines abandoned by original owners, forming two transportation areas under act of 1920. One system abandons alternative bus line in favor of trolley.	
Machine Speeds Up Concrete Finishing.....	61
Coupon Books Arranged to Extend Transfer Privileges....	62
Emergency Valve for One-Man Cars.....	62
Railway Collects Souvenirs	62
Purchased Power for Illinois Central.....	63
Contract between railroad and Commonwealth Edison Company provides for supply of all energy required in electrified Chicago terminal zone. Seven substations totaling 40,500-kw. capacity to be owned and maintained by Edison company.	
Buscs Link Industrial with Residential Section.....	65
Clearing Trouble on Underground Feeder Sections.....	67
American Association News	68
Maintenance of Equipment	70
News of the Industry	73
Financial and Corporate	79
Personal Mention	81
Manufactures and the Markets.....	83

McGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York

JAMES H. MCGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MUIR, Vice-President
E. J. MAHSEN, Vice-President
MARION HUTTON, Vice-President
JAMES H. MCGRAW, JR., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary

WASHINGTON:
Colorado Building
CHICAGO:
Old Colony Building
PHILADELPHIA:
Real Estate Trust Building
CLEVELAND:
Leader-News Building
ST. LOUIS:
Star Building
SAN FRANCISCO:
833 Mission Street

LONDON:
8 Boulevard Street, London, E. C. 4
Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations

The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries \$3 (total \$7 or 10 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 25 cents.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place. Copyright, 1925, by McGraw-Hill Company, Inc. Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office at New York, under the Act of March 3, 1879. Printed in U.S.A.



Cable Address: "Machinist, N. Y."
Publishers of
Engineering News-Record
American Machinist
Power
Chemical and Metallurgical Engineering
Cool Age
Engineering and Mining Journal-Press
Ingénieur International
Bus Transportation
Electric Railway Journal
Electrical World
Electrical Merchandising
Radio Retailing
Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
American Machinist—European Edition
(Published in London)

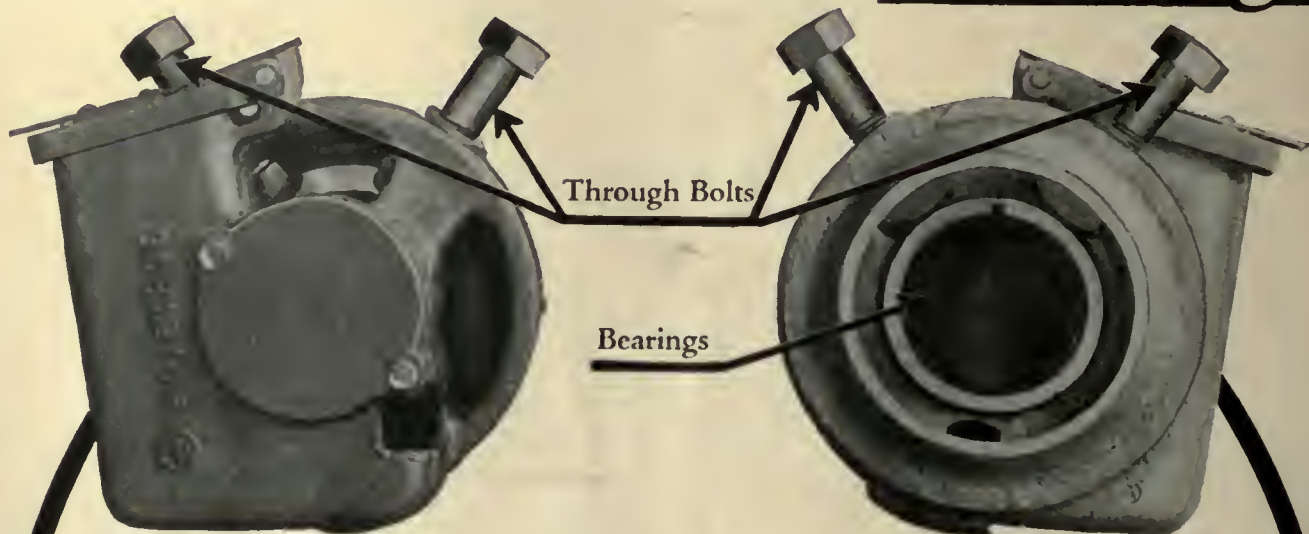
Not Decorating but Working

A SHORT while ago, when visiting a prominent electric railway man, a representative of this paper had to wait a few minutes in the reception room. Naturally he looked at the magazines neatly displayed on the table. He was somewhat surprised to find that ELECTRIC RAILWAY JOURNAL was not among them, although most of the other engineering and trade papers were there.

On entering the private office the reason was at once apparent. A table was piled high with files of the most used publications. Among them was the JOURNAL, and the current issue lay on the railway man's desk, open, giving mute evidence of its use as part of his working equipment. A few moments conversation showed that he was thoroughly familiar with the recent happenings in the field as published in the JOURNAL.

The paper was doing its double duty—first, as a chronicle of the latest news; and second, as a working tool for supplying needed technical information.

Railway Renewal Housings



Westinghouse Renewal Housings, which embody most of the characteristics found in the housings of modern Westinghouse Railway Motors, have been developed for many of the older types of Motors.

Be sure that the Renewal Housings you buy embody the following points:

Through Bolts—Proper Bearing Fit—Material which may be easily repaired.

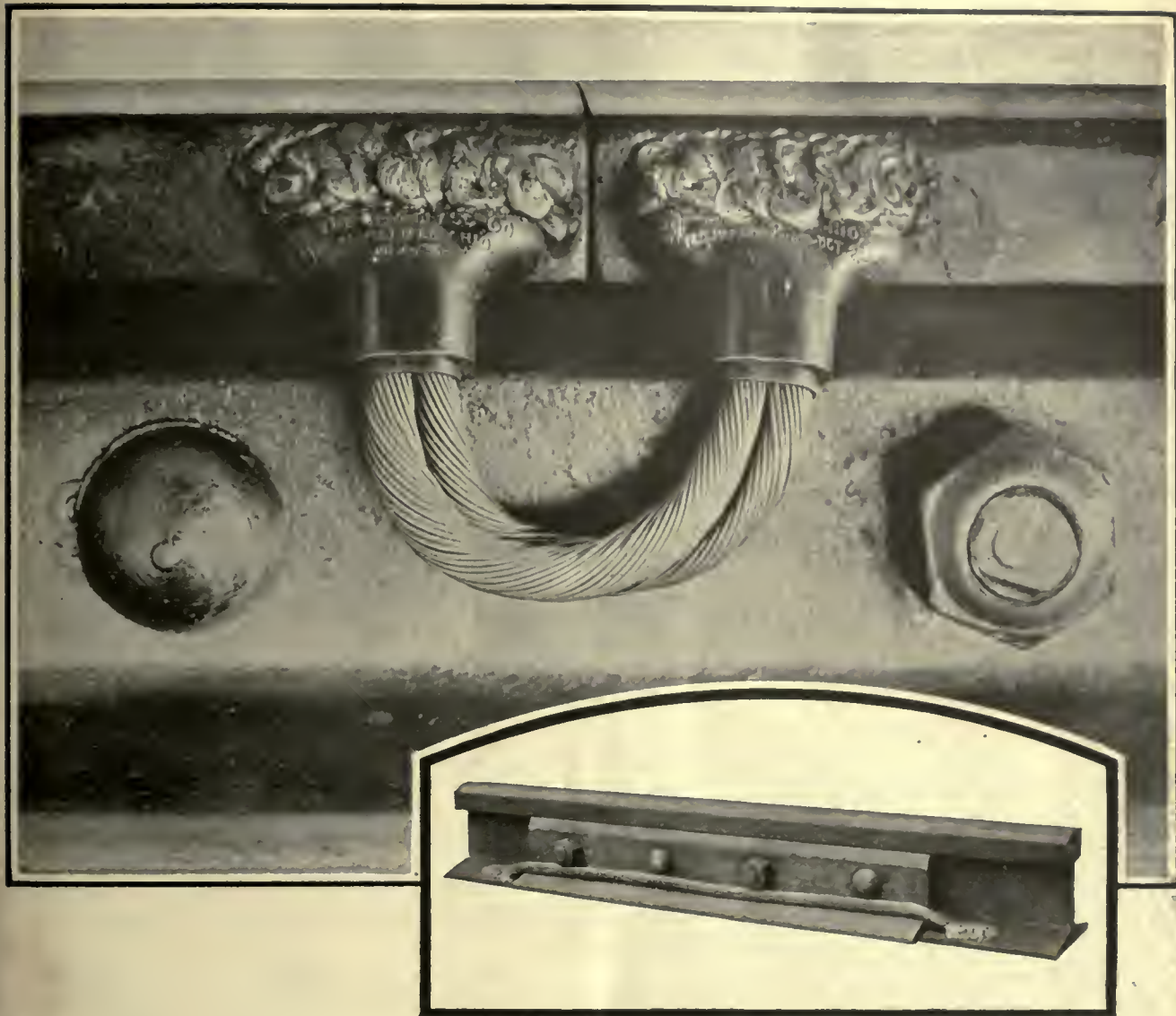
Cast-Steel Housings are the best. Malleable Iron has very good wearing qualities.

Both standard and over-size housings can be furnished: Standard size for unworn frame fits. Over-size for worn frame fits which must be bored out.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the
United States and Foreign Countries.



Westinghouse



Give Confidence to the Welder

O-B Arc Weld Bonds give confidence to the welder because he quickly learns how easy they are to weld—*steel* terminal to *steel* rail with *steel* welding rod. This confidence and ease of application insure a high percentage of 100% joints.

The Ohio Brass Co.
Mansfield, Ohio

B
PRODUCTS



Economy—

the prevention of loss through theft and vandalism — prompts you to fence your property. Why not get the maximum economy by installing Cyclone "Galv-After" Chain Link Fence? Lasts years longer. Provides economical, enduring protection for power plants, rights-of-way, storage yards, car barns. Effectively safeguards the would-be trespasser. Specially built in removable panels for transformer station enclosures.

We also manufacture Iron Fence for industrial uses. Appropriate designs for intertrack, park and other property fencing.

Write nearest offices for complete information.

CYCLONE FENCE COMPANY

Factories and Offices:

Waukegan, Ill.	Cleveland, O.
Newark, N. J.	Fort Worth, Tex.

Western Distributors:

Standard Fence Co., Oakland, Calif.
Northwest Fence & Wire Works, Portland, Ore.

*The Mark
of Quality*



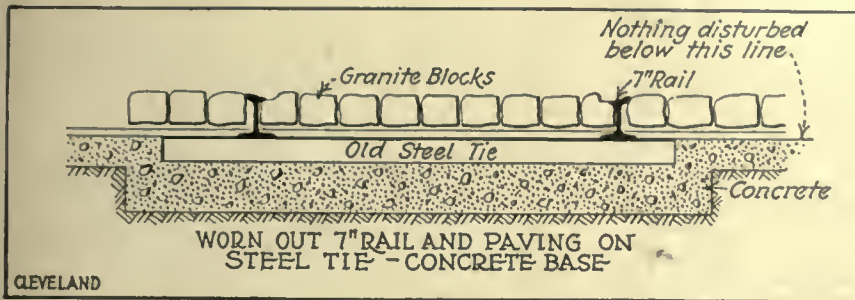
*Fence and
Service*

Cyclone

"Galv-After" Chain Link

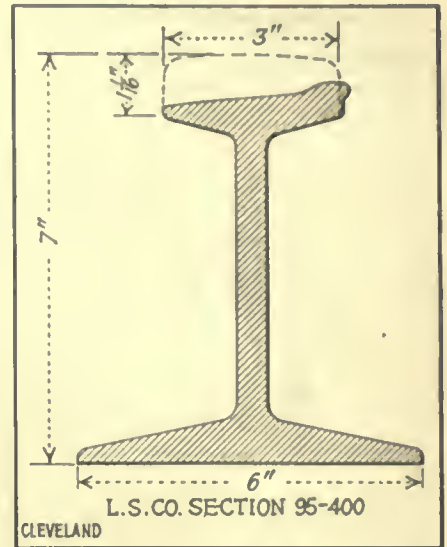
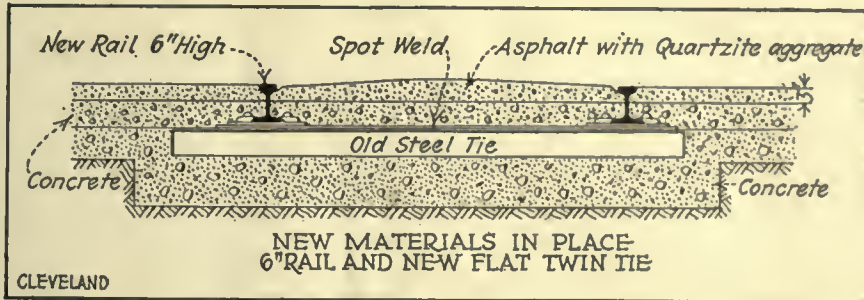
Fence

PROPERTY • PROTECTION • PAYS



Cross Section Showing Details of Track Construction on Euclid Avenue, Cleveland. Rail Worn Out, Concrete Base Still in Good Condition.

Details of method of Replacing Rail on Old Concrete Base, Using Special Flat Steel Twin Tie.



Cross Section of Rail on Euclid Ave., Cleveland, Showing Wear on Ball of Rail

Low Cost Construction that Outlasts the Rail

The most startling development in track construction for paved streets has been successfully worked out during the past two years in the renewal of rail and paving on a Steel Tie Concrete Base.

Planning your new paved track for renewal by using Steel Twin Tie Construction will require no large investment in initial cost. Our definite cost records for 1924 show costs as low as \$8.35 per single track foot for the track complete, including removal of the old construction and concrete paving surface.

For conservative-minded executives who have questioned the comparative life of concrete construction there is a complete answer in the reconstruction of such track at the end of a satisfactory rail life in Cleveland and elsewhere.

In planning 1925 paved track construction investigate the low cost paved track construction that outlasts the rail with all assurance that asking us to present all the data by personal call or in the mail will involve no persistent or annoying solicitation.

The International Steel Tie Co., Cleveland, Ohio

Steel Twin Tie Track

Renewable Track . . . Permanent Foundation

→ Before you buy **POLES** — See Weyerhaeuser ←

A Pole Selling Policy That May Fit Your *Buying* Needs

WHEN Weyerhaeuser enlarged its pole service it wasn't the intention to scoop up orders as fast as stocks accumulated. That is not the way Weyerhaeuser does business.

The Weyerhaeuser policy has always been to take good care of a group of permanent customers, to ascertain their needs and to meet their requirements as they arise.

Weyerhaeuser men do not claim to make all the good poles. However, this organization does maintain a high standard in the selection of pole timber which results in uniformly good poles. Timber not meeting this standard goes to the saw mill where it is cut into material for which it is suited.

Weyerhaeuser poles formerly sold through jobbers are now being marketed direct to users as announced a short time ago in this publication. A clientele of permanent customers is being built up. Quite a few pole users say our policies and service are just what they have been looking for. Perhaps you will feel as they do. The next time you are in the market for treated or untreated poles or piling give this specialized service a tryout. Prices by mail or wire.

WEYERHAEUSER SALES COMPANY

Distributors of

WEYERHAEUSER FOREST PRODUCTS

General Offices: SPOKANE, WASHINGTON

Branch Offices

ST. PAUL CHICAGO BALTIMORE NEW YORK
2694 University Ave. 208 S. La Salle St. 812 Lexington Bldg. 220 Broadway

F. H. Burke, Chicago Office, Manager of Cedar Pole Sales
R. L. Bayne, Spokane Office, Manager of Cedar Pole Service

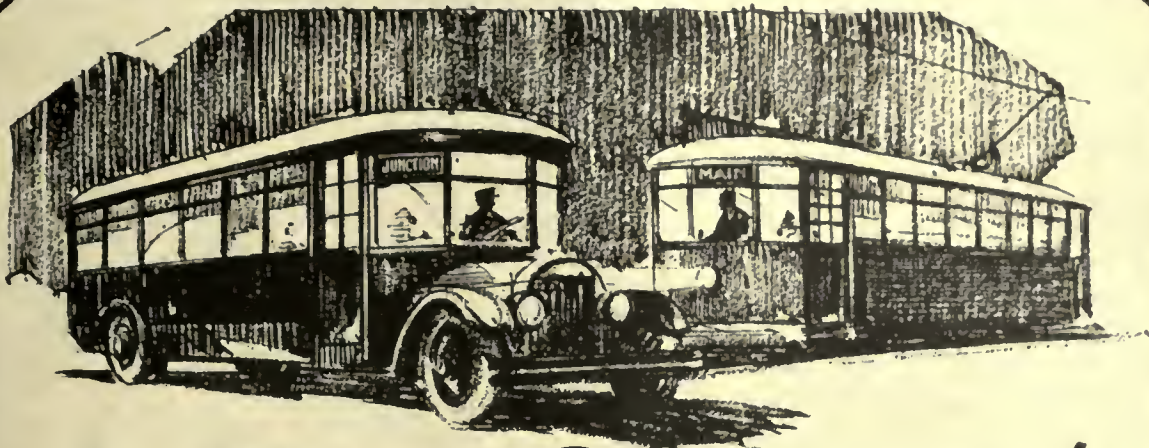


Weyerhaeuser Idaho Red Cedar Poles in the lines of the Beloit Water, Gas and Electric Company, Beloit, Wisconsin



Weyerhaeuser Idaho Red Cedar Poles





Well lighted Buses—also!

Lessons learned from street car operation apply to buses too. You've found that the brightly lighted trolley car attracts and satisfies patrons. Same thing applies to buses. Patrons won't ride in the dark. You can't expect them to be satisfied with dim and flickering toy lights.

Brightly lighted buses, where reading can be done in comfort will attract more traffic.

The famous Keystone Line includes

BUS LIGHTING FIXTURES



These fixtures enjoy a high-standing with leading bus manufacturers and operators. They are built around the standard Mazda C 21 c.p. lamp. It is up-

to-date, efficient and thoroughly satisfactory. Two leading models illustrated, one for street car type buses, the other for low head-room deluxe type coaches.

ELECTRIC SERVICE SUPPLIES Co.

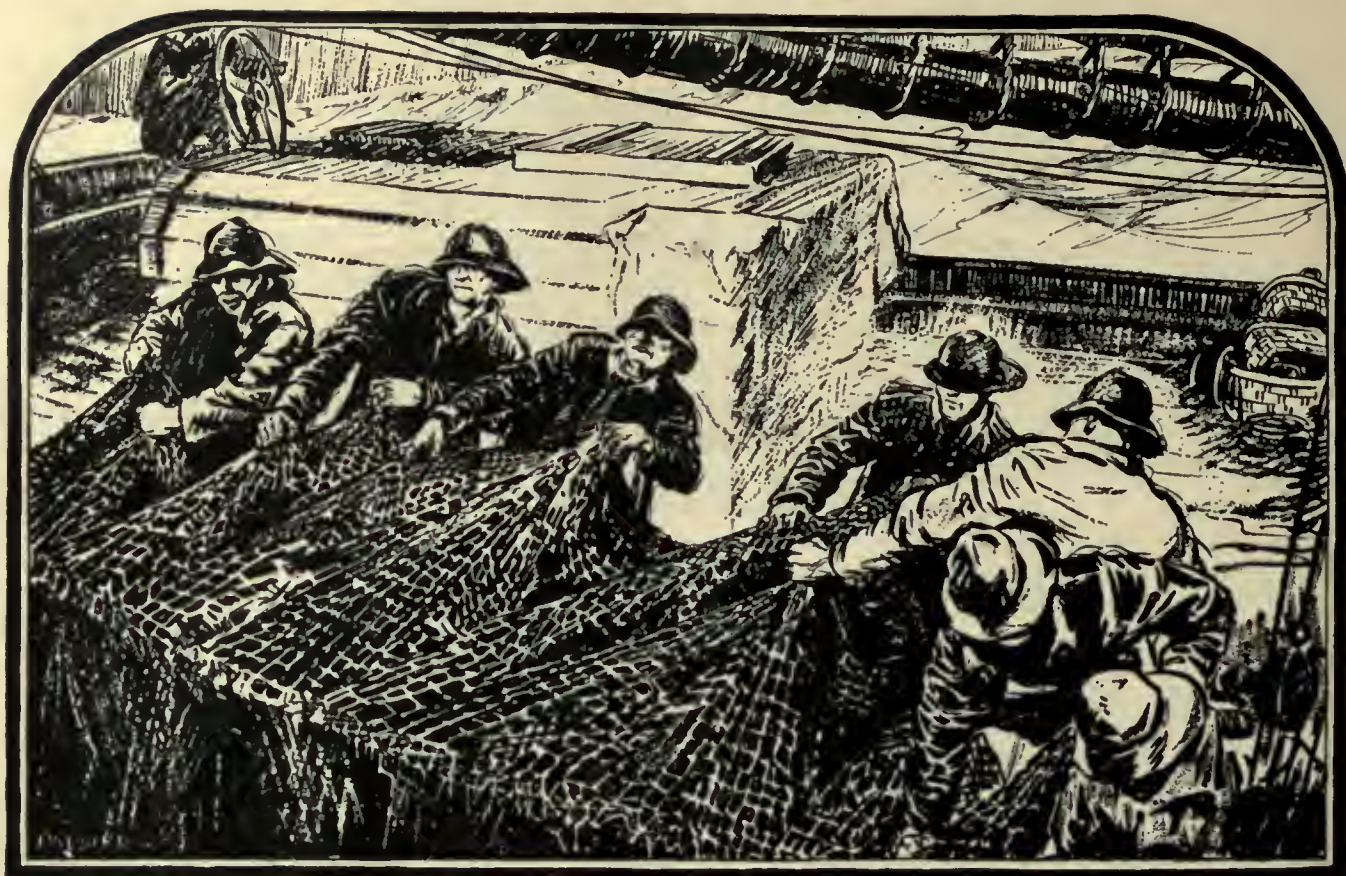
PHILADELPHIA
17th and Cambria Sts.
PITTSBURGH
829 Oliver Building

NEW YORK
50 Church St.
SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.
BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver





Comradeship of Purpose

BEHIND each major industry are its supporting industries. Great businesses founded for vital service. Like the foundations of imposing buildings—out of sight, perhaps, but underlying and supporting the main structure.

The car-building and car-repairing industry represents one great pillar supporting the railroads. Acres, miles and millions are involved. The work is carried on in a hundred different centers—strategically located. The plants cover thousands of acres. The bare investment in buildings and equipment is many millions of dollars. The men employed number more than one hundred thousand.

All this for one result: the ability to deliver within one year four hundred thousand new and rebuilt freight cars, plus thousands of other cars for passenger

trains and other thousands for electric railways.

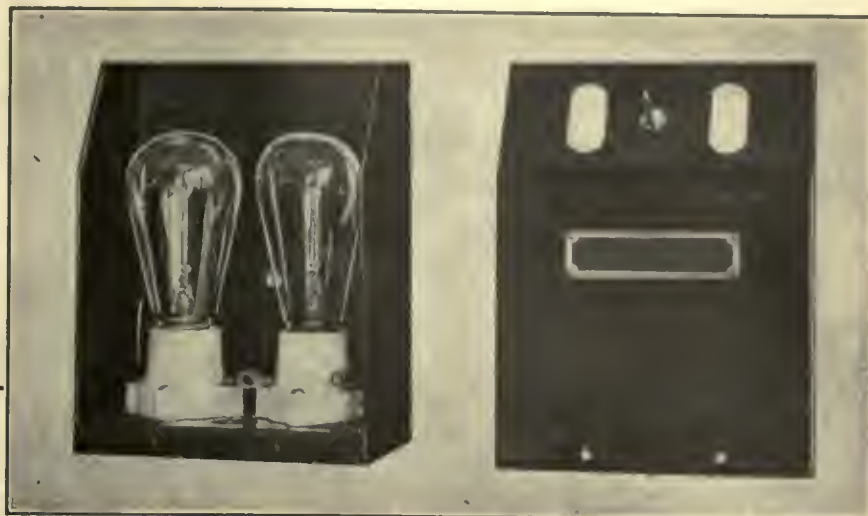
A tremendous industry created to fill the needs of the railroads. Growing with the railroads. Refining and improving its equipment and procedures in the interest of greater economy.

From the beginning this supporting industry has relieved the railroads from diverting transportation minds and money into manufacturing enterprises.

Now the car builders and car repairers have buttressed their supporting position. They are ready for the additional task of tomorrow—rebuilding the steel cars which time has marked. They are ready with man-power, with equipment and with capital. Therefore the railroads need not swerve from the task of furnishing transportation—work which they alone can do.



"Comradeship of Purpose" is one of a series of advertisements being published by the Railway Car Manufacturers' Association with the expectation that the facts they present will be mutually serviceable to the railways and to their supporting industries.



An Improved Type of
Motorman's Signal Light
It tells the traffic officer, also!

Here is a cab signal light which informs the "traffic cop" on the crossing as well as the motorman, when the doors are closed and car is ready to start. Secures traffic co-operation to prevent unnecessary delays. The box is installed so that holes in back of box come just above the window ledge, and the light shines out in front.

Every improvement included. There is an adjustable dimmer which protects the motorman from glare at night. Duplicate lamps provide against failure through burnouts.

You need this kind of time-saving equipment on modern city cars.

**NATIONAL
 PNEUMATIC
 EQUIPMENT**

DOOR ENGINES
 DOOR AND STEP
 CONTROL
 OPERATING
 MECHANISMS
 MOTORMAN'S
 SIGNAL LIGHTS

Write for full details.

National Pneumatic Company, Inc.

Originators and Manufacturers

EXECUTIVE OFFICE: 50 Church St., NEW YORK

Philadelphia—1010 Colonial Trust Bldg.

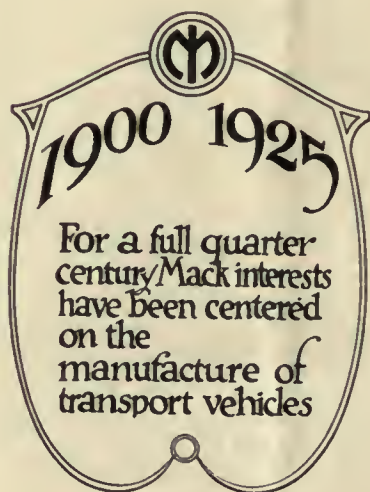
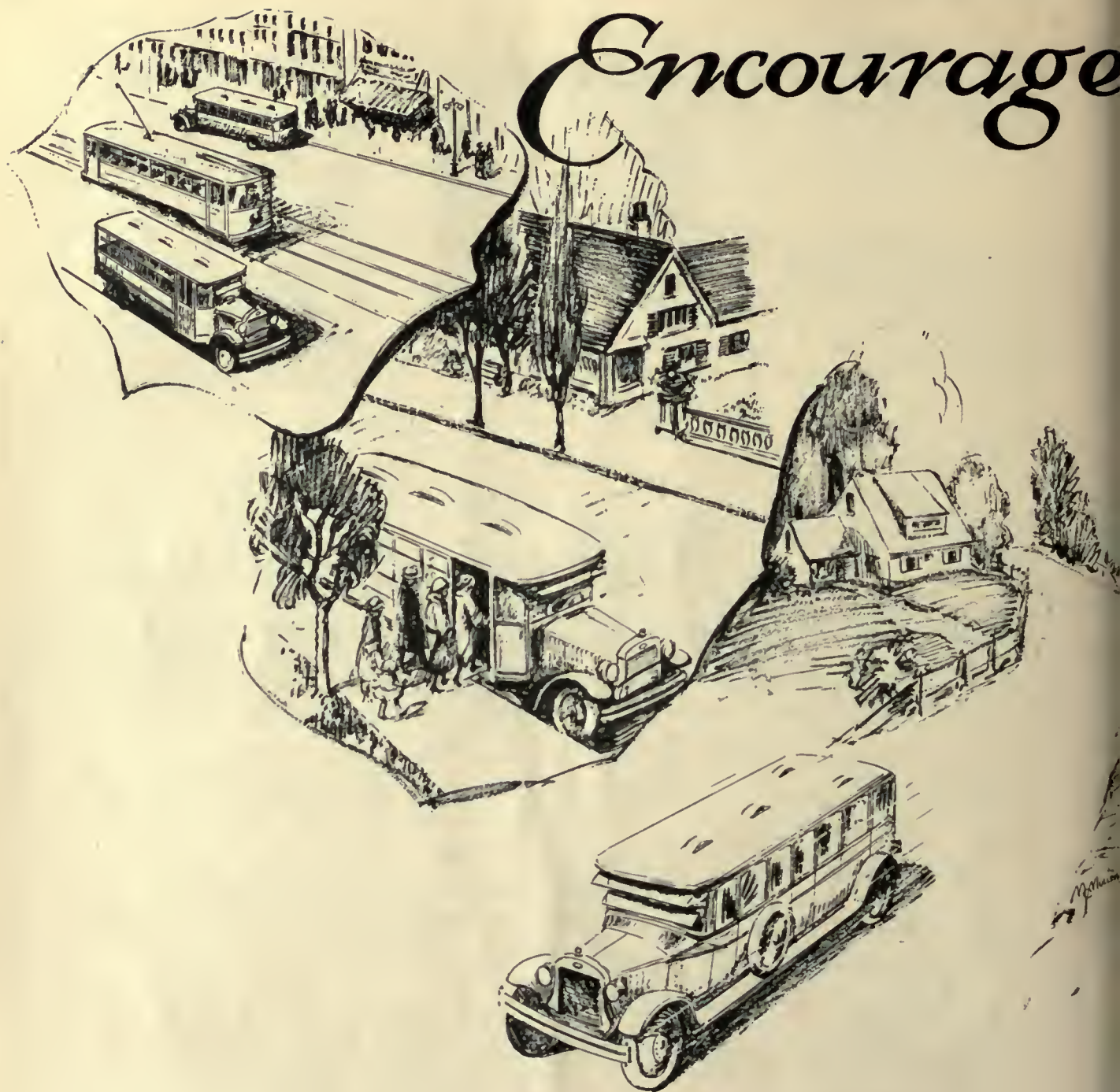
Chicago—940 McCormick Bldg.

General Works—Rahway, New Jersey

Manufactured in Canada by

Dominion Wheel & Foundries, Ltd., Toronto, Ont.

Encourage



For a full quarter
century Mack interests
have been centered
on the
manufacture of
transport vehicles

the riding habit *with Mack Buses*

Take the case of Smith, a farmer living five miles from town!

Or of Mrs. Brown living in an exclusive suburb!

Or of any man or woman faced with the problem of "getting aboard" at a crowded city terminal!

To each of them daily transportation has become a serious personal problem. And they travel just as infrequently as possible.

Yet they are all prospective patrons for a speedy, comfortable Mack Bus service.

Mrs. Brown and Smith are among the hundreds who would travel to town more frequently on suburban or interurban buses connecting with car lines.

Mack Buses stopping right at the doors of such people will bring them more often to the shopping centers—or to the car terminals.

Mack Buses on a local schedule supplementing

ordinary or express car service net big profits from short haul riders.

The highest degree of mechanical efficiency is found on all Mack Buses.

Chassis frame, including clutch, transmission, and engine floats on eight cushions of live resilient rubber in which the long flexible springs are embedded.

The long wheelbase assures ease of riding and the wide front axle insures stability and permits of short turns. Dual reduction rear axle is strictly a bus axle, designed to give maximum ground and underbody clearance with straight-line transmission.

Mack Bus engineers will explain the rest and assist in working out your operating plans.

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 BROADWAY NEW YORK CITY

Eighty-three direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

The Mack Bus



Sedan Type Bus

Performance counts!



2045 Variable Load Brakes

The Westinghouse Variable Load Brake has now been applied to 2045 surface cars by 14 different street railway companies.

It has filled a definite need for adequate control of modern light-weight cars, by providing for uniform retardation under widely varying load conditions.

The consistently short stops which it makes possible, means a saving in time that reflects itself in longer periods of peak-speed operation, and a general speeding up of traffic movement.

The Variable Load Brake will increase the earning capacity of your rolling stock.

**Westinghouse
Variable Load
Brakes are in use on
14 prominent railway
properties.**



WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works: WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES



Station CCH Broadcasting CAR SIGNALING DEVICES

This is station CCH the Consolidated Car Heating Company broadcasting direct from its factory at Albany.

Specify Consolidated and Be Sure

WHEN it comes to the latest and best in car-signaling equipment, come to Consolidated.

For years, Consolidated High Voltage Systems have been blazing the trail toward better service. Consolidated was the first in the field to institute and develop a high-voltage buzzer system. Gone is the old bell cord, pulled by hand and the make-shift dry-battery bell system.

Consolidated co-ordinated car signaling systems stand for the ideal method. Buzzers,

single-stroke bells, push buttons, motorman's signal lights and accessory equipment such as resistances, fuse boxes, etc. The latest Consolidated development is the combination in one small compact box of the interrupter, the resistance, and the fuse used in the high-voltage buzzer system.

Specify Consolidated and be sure!

Station CCH now signing off until next week, when it will resume the broadcasting of its regular weekly programs.

Good day!



CONSOLIDATED CAR HEATING COMPANY
ALBANY, N. Y.

New York

Chicago

HASKELITE

the



A year ago Pittsburgh Railways put in service forty new cars using HASKELITE for headlinings. Twenty five more cars also using complete HASKELITE linings were built during the year. Work has just started on 225 more cars of this type.

Pittsburgh Repeats on HASKELITE for HEADLINING

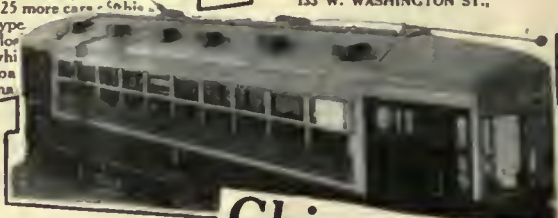
This and many other prominent car companies throughout the country have found in HASKELITE the ideal construction material.

HASKELITE MANUFACTURING CORPORATION
133 W. WASHINGTON ST., CHICAGO, ILL.



HASKELITE ROOFS

on Detroit Municipal Light Weight Cars
Built by New and Better Method



Chicago Surface Lines

have placed orders for 103 cars to be equipped with

HASKELITE ROOFS



The new cars built by J. G. Brill Co. for the York Railways, operated by Day & Zimmermann, Inc., are typical of what is possible through the use of these superior materials. Note the absence of headlinings and wall linings, the handsome exterior and interior. The big improvement in operating and maintenance costs cannot be shown in photographs, it must be experienced to be appreciated. Also print booklet and samples sent upon request.

HASKELITE

Headlinings again specified

Milwaukee Electric Railway and Light Co. places in service 35 new cars built by St. Louis Car Co. with Haskelite headlinings and interior trim.



Youngstown and Suburban Railway operated by Day & Zimmermann, Inc. use HASKELITE roofs and PLYMETL slides without head linings or side linings. Cars built by G. C. Kuhlman Car Company.

HASKELITE



and **PLYMETL**

Outstanding Construction Materials in 1924

Important Users of HASKELITE and PLYMETL in 1924

City of Detroit,
Dept. of Street Railways,
Detroit, Michigan.

50 HASKELITE roofs.

Pittsburgh Railways,
Pittsburgh, Pa.

225 cars with HASKELITE headlinings.

Chicago Surface Lines,
Chicago, Illinois.

103 cars with HASKELITE roofs and bulkheads.

Municipal Railways of San Francisco,
San Francisco, Calif.

HASKELITE roofs.

Milwaukee Elec. Ry. & Light Co.,
Milwaukee, Wis.

35 cars with HASKELITE headlinings and interior trim.

Cataluna Railways,
Barcelona, Spain.

PLYMETL sides.

Denver Tramways,
Denver, Colo.

HASKELITE exterior side panels and letter boards.

Twin City Rapid Transit Co.,
Minneapolis, Minn.

HASKELITE headlinings, interior linings and outside panels.

Columbus, Newark & Zanesville
Elec. Co.,

Day & Zimmerman, Inc., operators, Zanesville, O.
20 cars with HASKELITE roofs and PLYMETL sides.

York Railways.

Day & Zimmerman, Inc., Operators, York, Penna.
5 cars HASKELITE roofs and PLYMETL sides.

Duluth Street Railways,
Duluth, Minn.

HASKELITE headlinings roofs and interior and exterior side panels.

Los Angeles Street Railway,
Los Angeles, Calif.

60 cars with PLYMETL sides.

Detroit United Railways,
Detroit, Michigan.

20 city cars with PLYMETL sides.

10 interurban cars with PLYMETL sides and HASKELITE roofs.

United Traction Co.,
Albany, N. Y.

4 trackless trolley cars with PLYMETL sides.

Illinois Traction System,
Chicago, Illinois.

17 cars with HASKELITE roofs, floors and truss plants.

THE YEAR 1924 was marked by an extensive program of new construction over the country generally, and by considerable advance in features of design and construction making for lowering of maintenance and operating costs, and increasing passenger comfort. The "light weight" idea took great strides forward, being established as the aim of car designers and builders quite generally. A large share of the development of the car of today, and tomorrow, comes about through the use of HASKELITE and PLYMETL. These materials are becoming standard materials in the street car and bus body field, with a larger number of builders and operators every year. Their unusual characteristics of light weight and great strength have made them the choice of progressive engineers and have actually resulted in the development of a new form of construction. The progress made by HASKELITE and PLYMETL as construction materials in the street car field was demonstrated in the Atlantic City exhibit when fully 80% of the street cars and buses on exhibition had HASKELITE products. It is not too much to say that this year will see an increasing number of HASKELITE and PLYMETL cars placed in service.

An interesting and valuable booklet of blue prints and engineering data on the methods and advantages of using HASKELITE and PLYMETL will be available to every interested car builder or operator. May we send your copy today?

HASKELITE

MANUFACTURING CORPORATION

133 W. Washington, St., Chicago, Ill.

GENERAL ELECTRIC COMPANY

RAILWAY AND MINE HAULAGE MOTORS

ARMATURE INSULATIONS FOR TYPE GE MOTORS

Volts	Turns	Cat. No.
600	4	245840
600	3	245850
600	3	245860

One Catalog Number covers a complete set of insulations for a G-E Motor

RAILWAY SUPPLIES

GENERAL ELECTRIC COMPANY

**Your Text
Book
on
Equipment
Standards**



General Electric Company
Schenectady, N. Y.

Sales Offices in all Large Cities

They help you save

Why not duplicate the armature insulation put in new G-E Motors by the winders in the factory?

You can do it exactly with G-E ready-to-use Insulations. They come cut to fit, just enough in a package for one motor.

This saves your winder's time for cutting—avoids waste—is very convenient—and guarantees original quality of insulation in making repairs.

Many other short-cuts to economy are found in your G-E Catalog. Use it constantly.

GENERAL ELECTRIC

New York, Saturday, January 10, 1925

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HARRY L. BROWN, *Editor*

Volume 65
Number 2

Municipal Subways Not Favored at Transit Hearings

NEW YORK'S transit inquiry ended with the testimony of Mr. McAneny of the Transit Commission last Thursday. Judge McAvoyn, who has been conducting the case as the representative of the Governor, retires with several trunk loads of testimony and exhibits to try to fix the responsibility for seven years of delay in providing more rapid transit facilities. While there is no real reason for prejudging the case, several things do stand out in bold relief. Hylan proved himself to be even more impossible on the stand than he does as Mayor. On the other hand, Comptroller Craig showed the real grasp that he has of the questions affecting the finances of the city. Public necessity apparently compels him to sit with the Mayor on the handling of city matters, but he doesn't relish the association. That is quite plain. If there was a star witness at the hearing it was he. Even Counsel Sherman couldn't hold him in check. He quite ran away with Mr. Sherman on several occasions. Mayor Hylan caused a laugh because he knew so little; Mr. Craig caused a laugh because he knew so much.

The inquiry did not bring out anything startlingly new in the way of evidence. It did, however, accomplish a great public service in that it made more clear to the public some of the principal reasons for the traffic crowding in the New York subways. It also showed the futility as a remedial measure of Mayor Hylan's proposed independent subway system to be municipally owned and operated.

The present-day high cost of building subways was strongly emphasized in much of the testimony presented. The figures given in this connection confirm those printed in this paper at the time the routes of the proposed municipal subway were announced about a month ago, namely, that subway construction costs have more than doubled during the last 15 years. An estimate was given at the hearing by Commissioner Harkness that even with traffic as dense as that on the present subway lines, a fare of 8.45 cents would be required to make the undertaking self-supporting with this higher investment cost and greater fixed charges necessary. Commissioner O'Ryan, the following day, expressed the belief that the fare would have to be 10 cents. These statements must have been sad news to the Mayor, because the State law empowering the city to operate rapid transit lines definitely directs that after the first three years of operation the fare must be such as to pay interest and sinking fund charges on the investment, besides the cost of operation and other expenses.

Finally, Comptroller Craig, in other testimony this week, said the city had nowhere near enough margin over its constitutional borrowing limit to build a subway and that the suggestion that the construction might

be paid for in part by local assessment bonds was impracticable, even if such bonds could be issued constitutionally. In his opinion this could not be done. Other testimony clearly places the blame for the overcrowded conditions on the present municipal officials for their refusal to approve necessary extensions or appropriate money to build adequate shop facilities to keep the equipment in good condition.

Altogether the result of the hearing so far has been still further to discredit the municipal subway plan as a relief for present conditions.

Retaining Essential Transit Facilities

THE abandonment of various unprofitable electric railway lines in the past few years does not mean that there is no demand for them. In nearly every case citizens have voiced their opposition to cessation of service, and the step has been taken in spite of their protests. The reason for abandonment has been that an insufficient number of such persons have patronized the railways to let them earn their expenses.

Coupled with the small amount of traffic there have been various restrictions imposed by the municipalities through which the lines ran, as well as taxes of every sort and description that could be levied on the properties.

A law enacted in Massachusetts some years ago, but not invoked until last March, permits the communities themselves to acquire and operate such unprofitable lines through public trusteeships. In the article in this issue on publicly-owned transportation areas, it will be seen that some bankrupted electric railways have not been allowed to fall wholly into the hands of the junk man. Towns like Greenfield with 15,500 inhabitants, Montague City with 7,600 and Athol with 10,000 have lately taken advantage of the transportation area statute of 1920 by purchasing as much of the bankrupted local railways as was suited to their needs.

Inasmuch as these properties were acquired on "actual value at the time of appraisal and not on the cost of replacement," the investment in each instance is so small that the expense of running the properties could be made less than the cost of an equivalent motor-bus service. Operation also was simplified through the purchase of power. Taxes are sure to be less.

In spite of these advantages, it is not to be taken for granted that operation will be profitable. The traffic in Greenfield, for instance, is only one-third of what it was in 1917. The causes for the decrease include higher fares in a community where most people can walk, the great increase in private automobiles and a more exact-

ing demand for shorter headways and higher speed service than that which the railway had been providing.

Since the trustees have started with the same fares and service as the predecessor company, it is obvious that they are not banking on a return to old riding habits. The action of the citizens in voting to buy and continue the operation of the most essential portions of the electric railways in their territory can have only one meaning—that although the private automobile may decrease riding to an extent which makes operation for profit impossible, there is still sufficient need for a public utility system to provide a dependable means of transport throughout the day and most of the night for those who have no personal vehicles available. These long-headed New Englanders realized that their towns would suffer in business, pleasure and general civic activities if the woman who wanted to shop, the boy who wanted to go to the films and the elderly woman who wanted to go to the sewing circle were deterred from doing so because someone else in the family was out with the "car." Their example in establishing these transportation areas may well be cited by the harassed operator as proof that, in spite of millions of privately owned Fords, public transport systems are still a necessity.

Operating Men Realize Their Obligations More Clearly than Do the Bankers

ALTHOUGH the phrase "moral obligation to render service" is still distasteful to some of the older generation of railway men, the importance of fulfilling this obligation is clearly recognized by a large majority of the managements. The financial interests connected with the railways, however, do not always see the value of this policy and are sometimes inclined to condemn those phases of railway operation which do not show a direct profit.

However reasonable this attitude may have been years ago, recent developments have made the theory untenable. The advent of the bus made possible the establishment of a certain measure of transportation service without any large initial investment. Every one knows how this opportunity was availed of in many places to skim off the cream of the traffic and make a quick profit. To meet this situation, it has been, and still is, the contention of the existing transportation companies that needless duplication of service should not be allowed. More and more this proposition is being accepted by the general public.

But the acceptance of this proposition by the public carries with it an obligation upon the railway. If the railway claims the right to be protected where it is already furnishing adequate service, it must also undertake to furnish whatever service is required. In other words, when the public is willing to forego the temporary advantage of duplicate service, the railway ought in return to provide facilities wherever needed, even if necessary to forego immediate profits on such extension of service. If the traffic is light in such cases this may perhaps entail a loss that looks bad on the balance sheet. The experienced operating man, however, who is usually in closer touch with public feeling than are directors of the company, knows that the railway can well afford to stand this small loss if giving service in one place keeps out competition in another.

Prompt Publication of Statistics Supplies a Distinct Need

IT IS but natural that events which occur regularly become commonplace after a while and are accepted as a matter of course. In a sense this may have been the feeling with which many of the readers of this paper received the Annual Statistical Number of ELECTRIC RAILWAY JOURNAL, published last week. Such a number, issued on the first Saturday of each January, has been a feature of this publication since 1908. Each year the principal statistics indicating the advance of the industry during the previous 12 months have been compiled through correspondence and in other ways and are made available through the JOURNAL for immediate use of its readers.

Obviously, much of this information has to be collected before the close of the year, and a great deal of it is based on data collected and filed from January to December of the year just closed. During the last few weeks of December, all of this information is collated, digested and supplemented by last-minute telegraphic advices to complete the tables and statistical information, and to form a basis for the articles and editorials in the statistical issue. From time to time some new feature of an appropriate nature has been added to the series of statistical issues, so that now much more complete data relative to the electric railway industry are printed, and on a wider range of subjects, than it was attempted to cover in the early numbers of this kind.

The execution of such an undertaking would be impossible without prompt and cordial responses of the various electric railway companies to requests for information from the editorial staff. The editors take this occasion to express their sincere thanks for this co-operation and for its practically unanimous nature. A large number of questionnaires were sent out to large and small companies alike, and in some cases to companies which had ceased operation. Despite this, replies were received promptly to each list of questions from many more than 90 per cent of the properties addressed. It is doubtful if any other industry has ever shown such a large proportion of replies in so short a time to such extended lists of questions. Yet this experience is repeated year after year with the statistical issue of this paper.

The extent to which the statistics published in the JOURNAL annually in this way are quoted in and out of the industry justifies the publishers of this paper in believing they are performing a needed service. So many requests for copies of the Statistical Number were received last year that the issue was soon exhausted, even though the precaution had been taken to print an extra large edition. Certainly if this work was left to be performed by the government, the figures would not be available three days after the close of the year. The reports of the Census Bureau are models of accuracy and completeness, but they are not noted for the promptness of their publication. The census of the electric railway industry, taken by the Census Bureau in 1922, has still to be made available to the public in complete form. While the elaborate figures issued by the government have their place, it is to supply the obvious need for a more rapid survey that the Statistical Number of ELECTRIC RAILWAY JOURNAL has been published year after year.

I.T.S. Buys Observation Interurban Cars

Light-Weight, One-Man Interurban Cars for Illinois Traction System Have the Main Passenger Compartment at the Front End with Smoker and Baggage Space at the Rear—
They Are Arranged for Single-End Operation, with a Back-Up
Device for Switching and Reversing at Terminals



Double-Arched Windows Give the Exterior an Attractive Appearance. The Rear Folding Doors Are Used for Loading Baggage, but a Step Is Provided so that Passengers at Busy Terminals May Board or Alight at Both Ends

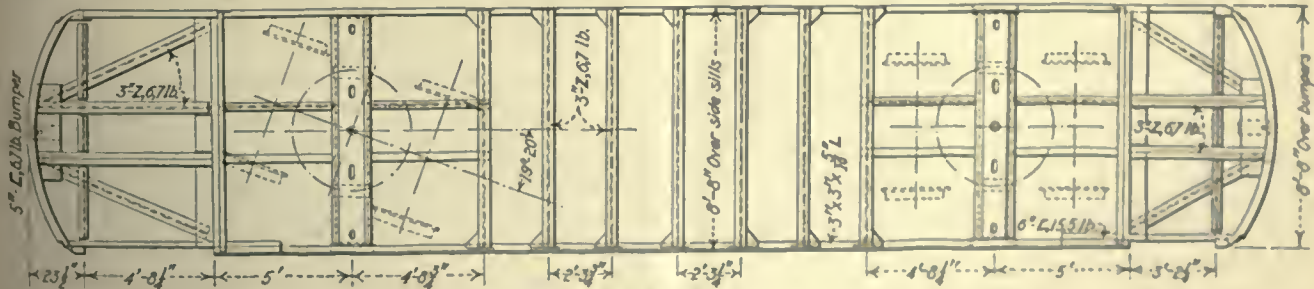
SEVENTEEN light-weight, one-man, double-truck interurban cars recently were placed in service on the Illinois Valley division of the Illinois Traction System. They embody a number of novel features of design for this class of equipment, which have attracted increasing attention from interurban operators interested in improving the quality and frequency of service while at the same time holding operating costs to a minimum. These cars were developed with the idea of providing a type of equipment which would attract increased patronage by affording greater convenience and comfort to passengers and also present that appeal to the prospective rider which is made by an attractive and inviting general appearance.

OBSERVATION COMPARTMENT AT FRONT END

These cars were built by the St. Louis Car Company, and are designed primarily for single-end operation, thus making a substantial saving in weight and cost, and at the same time increasing the seating capacity.

Further advantage is taken of this method of operation to arrange the main passenger compartment as an observation section, giving an unobstructed view of the track and landscape ahead. Careful consideration of the factors which affect the pleasure of a ride in any vehicle led to this step, and it is held to be an important feature in the merchandising value of the design. It has been pointed out that the pleasure of an automobile ride would be almost entirely lost for the passengers in the rear seat if a curtain were mounted back of the driver so that they could not see out the front end of the vehicle. Putting the main passenger compartment at the front end of an interurban car was therefore held to make the ride much more pleasant, and from that standpoint the arrangement was considered to have a material merchandising advantage.

Although the cars are designed for single-end operation, a back-up device allows the cars to be controlled from the rear end for switching purposes at Y terminals. This is accomplished by means of a three-way



Truck shown on 35' Road curve
The Vestibule Floors Are Carried Across Flush with the Body Floor, Giving a Strong Underframe.
A 3-In. Z-Section Is Used for Cross Sills

by side with comfort. The arrangement of springs prevents a heavy passenger from dislodging a lighter passenger seated on the same cushion. These cushions are 7 in. thick. The seats are quite low, the over-all height from the floor to the top of the cushion being only 17 in.

The steel framing construction is more or less standard, but the design was worked out with a view of obtaining minimum weight consistent with proper strength and safety. The side girder sheets are



The Cars Are Mounted on St. Louis Cast-Steel Frame, Equalized Trucks of 5-Ft. 9-In. Wheelbase with 26-In. Diameter Davis Cast-Steel Wheels

SOME OF THE PRINCIPAL ITEMS OF EQUIPMENT

Warning signal.....	Strombos horn
Water cooler.....	Dayton No. 320
Ventilators.....	St. Louis Car Company, Peerless
Trolley retracters.....	Ohio Brass
Destination signs.....	Hunter No. 8
Step safety treads.....	Feralun
Sash fixtures.....	O. M. Edwards
Headlight.....	Crouse-Hinds
Heaters.....	Peter Smith hot air No. OP-1
Back-up equipment.....	General Electric
Meters.....	Economy, with inspection dials
Door engines.....	Universal
Curtain fixtures.....	Curtain Supply Company No. 88 pinch handle
Curtain material.....	Double-faced Pantasote
Signal system.....	Faraday
Hand brakes.....	Peacock staffless
Roof covering.....	No. 8 cotton duck
Trolley base.....	Ohio Brass
Rails and stanchions.....	Aluminum
Trimlings.....	Bronze, polished and lacquered
Dry hopper.....	Dayton

straight and are made of $\frac{3}{8}$ -in. steel. The lower floor is $\frac{1}{2}$ -in. Haskelite, covered with $\frac{1}{2}$ -in. tongued and grooved yellow pine. This floor construction is expected to add materially to the stiffness of the body. In the aisles, the wood flooring is covered with $\frac{3}{8}$ -in. brown battleship linoleum.

Formed Haskelite in large panels is used for the roof. The hoods are made of two-ply poplar slats, and the headlining is three-ply poplar veneer. Between the side girder sheet and the inside lining, and also between the roof and headlining, Balsam wool is used for insulation. Between the side sheets and inside lining there is one layer of 1-in. insulation, while two layers of 1-in. material are used between the roof and headlining.

The interior is finished in mahogany, including doors and sash. Both inside lining and truss plank are made of Haskelite, the former being $\frac{1}{2}$ in. thick and the latter

$\frac{3}{4}$ in. Continuous Gothic sash between the letterboard and the lower sash are permanently fastened in place, and a removable panel is fastened back of the sash on the interior of the car so as to give a deep paneled effect on the interior, while providing better heat insulation. Storm sash for the lower windows are provided for winter use. At the front end the vestibule is glazed with $\frac{1}{2}$ -in. non-shatterable glass.

The complete weight ready for service is 36,840 lb. The cars are mounted on St. Louis Car Company equalized cast-steel frame-type motor trucks of 5-ft. 9-in. wheelbase, with 26-in. Davis cast-steel wheels having $3\frac{1}{2}$ -in. threads. Axle diameters are $4\frac{1}{2}$ in., with $3\frac{1}{2}$ x7-in. journals. The motive power consists of four GE-265 motors, rated at 35 hp. each. The control is K-35 KK. Air-brake equipment is Westinghouse single-end, with a DH-16 compressor, and full safety car equipment of the Safety Car Devices Company. Some of the other principal items of equipment are given in the accompanying table.

Portable Substation Operates at Different Voltages

A PORTABLE substation, designed to operate at either 13,200 volts or at 6,600 volts, has been built by the Bangor Railway & Electric Company. Some time ago, when changes were being made in the city substation of the railway, trouble was experienced at an outlying substation. A rotary converter was placed on a freight car and taken to the point of trouble to replace the disabled machine. The latter was then



An Observation Section and a Baggage Compartment Are Provided in the T. S. One-Man Interurban Car

The observation feature is obtained by placing the main passenger compartment at the front end of the car. Aluminum coat

hooks instead of the more usual baggage racks help to give the interior a clean-cut appearance.

In the baggage compartment at the rear, upholstered folding seats provide for passengers when required.



All of the Apparatus of This Portable Substation Has Been Placed Inside of the Car Body

brought back and repaired. It was decided, however, that instead of installing the machine in place of the one which had been moved to the outlying substation, it should be left on the flat car for use as a portable substation in case of emergency.

A body was built on this car at the railway shops and the necessary equipment was installed. Live line grippers are used to connect with the transmission lines. These take the high-tension current to a change-over switch which is interlocked with the oil switch. Ample transformer capacity is provided for either voltage. Direct current for railway operation is supplied by a 500-kw. rotary converter.

All the apparatus has been placed inside the car. The converter occupies the opposite end of the car from the transformer and switches. It has been mounted on a platform which is adjustable so that the converter will stand level no matter what the slope of the car floor may be. The expenditures made to construct this portable substation were very moderate and it has proved extremely useful, obviating the necessity of buying stand-by equipment for several permanent substations.

Special Bus for Inspection Trips

FOR the use of officials of the company making inspection trips to points not easily reached by rail the Public Service Railway, Newark, N. J., has purchased a specially equipped Fageol bus. A leather topped table which jack-knives and folds down against

the wall has been provided so that the bus can be used as an office while en route. When the table is folded, all chairs, which are independent and movable, can be faced forward. Seating capacity for 18 persons is provided in individual wicker chairs.

An electric fan has been mounted on the partition in back of the driver's seat and is operated from the car's 12-volt storage battery. Another feature of the equipment is a telephone from the center of the main compartment to the driver. Baggage space is provided in compartments beside the driver and at the rear of the bus.

The interior is attractively finished in gray silk mohair plush. Upholstery is done in green colonial grain leather. The floor is covered with a heavy velvet carpet. Mirrors, ash receivers, nicked hardware, and hand-rubbed mahogany window trim add to the con-



A Folding Table Makes It Possible to Utilize This Bus as an Office While en Route

venience of the passenger and the appearance of the vehicle.

Many of the stations of the Public Service Electric & Gas Company are not located on the lines of the Public Service Railway. Moreover, a number of bus routes operate over highways remote from the rail lines. The bus will afford a convenient means for officials to reach points away from the rail lines, but will not supplant the parlor car heretofore used for inspections of the railway property. It is planned to rent this vehicle, when not otherwise in use, to persons desiring to arrange special parties.



Bus Used by Railway Officials in Making Inspection Trips to Points Away from Tracks

Atlanta Improvements to Cost \$9,000,000

Changes Recommended in Beeler Report Include Rerouting of Cars, Elimination of Jitneys and Establishment of Bus Service by the Railway, Widening of Streets and Construction of New Viaducts—Underground Moving Sidewalks Proposed for the Business District—City Is to Bear 75 per Cent of the Total Expense

WHAT amounts virtually to a revised city plan for Atlanta, Ga., with many extensive changes in streets and transit facilities, is recommended by the Beeler Organization, New York, in a series of eight reports recently presented to the special traction committee of the Council. Study of this subject was undertaken early in 1924 as the result of a petition in which the Georgia Railway & Power Company stated that the credit of the railway department was exhausted and that relief was imperative if it was to continue to function and serve the community properly. At that time the company asked for the elimination of jitneys from streets on which the cars operate, a revision of its routes and the abolition of unnecessary stops. Some relief from paving burdens and a higher fare also were desired by the railway.

In general, the Beeler report upholds the position taken by the company and recommends the elimination of jitneys, rerouting and relocation of stops on all car lines. Relief from paving burdens is also recommended, but a ticket rate of four for 25 cents is held to be preferable to that of three for 20 cents as requested by the railway. Thus the price of a single ticket would be 6½ cents as against 6⅓ cents. The petition and the report are in accord in fixing the cash fare at 10 cents.

Together with these changes it is proposed that new viaducts be constructed, that certain streets be widened and some new streets cut through, and that an underground moving sidewalk be built. Bus service operated by the railway in conjunction with its car service is suggested. According to the report these changes should result in increasing the company's net revenue from \$500,000 to \$1,200,000. Financial aspects of the report are dealt with in this article. Readjustment of service and routes as well as the new construction necessary to put this plan into effect will be described in later articles.

Atlanta is a young city that has grown beyond the wildest dream of its founders. From 1860 to 1870 it increased 128 per cent; from 1880 to 1890 it increased 77 per cent, and from 1900 to 1910 it maintained practically the same rate of growth. The present tendency is to build up the territory immediately beyond the city faster even than the city itself. Population figures for the city and the 7-mile zone are given in an accompanying table.

In all questions pertaining to transit in Atlanta the

race problem must be considered. At present the population of the city is divided between whites and colored in a proportion of approximately two to one. Of the colored residents 90 per cent live within a radius of 2 miles from the business center. They are generally grouped in the valleys. Due partly to topography and in some instances to lack of adequate transportation facilities there are a number of districts comparatively close in where little or no development has occurred.

The city system of the Georgia Railway & Power Company comprises 81.92 miles of double track and 56.116

PASSENGER STATISTICS BY YEARS, 1910-1924

Year	Revenue Passengers	Transfer Passengers	Free Passengers	Total Passengers
1910	44,908,137	9,918,969	697,331	55,524,437
1911	50,235,340	11,274,778	736,619	62,246,737
1912	54,345,498	12,119,284	871,345	67,336,127
1913	57,400,821	13,008,050	994,580	71,403,451
1914	56,643,974	12,799,194	873,347	70,316,515
1915	52,649,629	12,449,576	4,402	65,103,607
1916	53,684,771	12,831,650	3,629	66,520,050
1917	59,228,227	14,155,060	3,606	73,386,893
1918	70,573,593	14,830,912	74,699	85,481,204
1919	76,804,565	16,704,145	87,346	93,596,056
1920	77,284,154	17,359,439	None	94,643,593
1921	73,611,786	17,744,693	None	91,358,479
1922	73,253,211	18,917,453	None	92,172,664
1923	73,518,711	19,838,406	None	93,357,117
1924*	73,413,026	19,967,263	None	93,380,291

*Estimated

miles of single track. Of this, about 210 single track miles are used for passenger car operation. The 23 car lines reach practically all of the developed portions of the city and its suburbs within the 7-mile zone. Week-day schedules require 187 cars during the day and 330 during the rush hours.

A complete survey was made by the Beeler Organization of the routes of the railway. This included traffic checks, riding logs and general observations. Passenger counts covering a period of two days were taken at the peak points of all the lines. One-day counts were taken at the short line points and other places concerning which information was desired. In all 45 locations were checked from 6 a.m. until midnight. Loading characteristics of the various lines were analyzed from data gathered on 150 round trips. Each trip record shows all stops, the location and volume of passenger interchange, length of stops, any delay and its cause. Similar observations were made also of the jitneys to determine their effect on the problem. Special studies were made of vehicular movements and pedestrian traffic.

RAILWAY TRAFFIC IS DECREASING

From 1910 to 1920 the number of revenue passengers carried by the railway increased. At the beginning of this period the railway was carrying 45,000,000 passengers a year while at the end of the decade the total reached more than 77,000,000. Since 1920 the tendency has been downward. Preliminary estimates are that only 73,400,000 passengers were carried during 1924. The revenue rides per capita show a similar fluctuation.

POPULATION OF ATLANTA AND SUBURBS, 1850-1940

Year	City of Atlanta	7-Mile Zone
1850	2,572	
1860	9,554	
1870	21,789	
1880	37,409	
1890	66,533	80,972
1900	89,672	112,798
1910	154,839	172,613
1920	200,616	228,782
1930 (estimated)	263,000	324,333
1940 (estimated)	325,000	425,000

The peak was reached in 1919 with 344. The present trend is downward and indications are that the figure for the year just ended will be about 277. Detailed figures are given in an accompanying table.

During the last 4 years the railway has had to meet increased operating expenses while its revenues have been depleted by unregulated and pernicious jitney competition, the month of September showing a loss of nearly 670,000 revenue passengers as compared with the year before. Net earnings are so low that they fail to attract the necessary new capital to make the desired changes and improvements in equipment and service.

Various causes are given for this falling off in street car riding habit. The great growth in the use of the private automobile, taxicab and jitney are factors. The latter, of which there are now some 275 licensed, are by far the most serious form of competition. They operate directly upon and along the tracks of the best lines where the population is dense and short-haul traffic exists. If the 7,750,000 jitney bus passengers now carried annually were transported by the railway, the revenue rides per capita per mile of track would be 1.46, which is about what it should be under existing business conditions.

Careful computation shows that the number of passenger vehicles in use on Atlanta's streets as of January, 1924, were as follows: Street cars, 330; private automobiles, 27,540; jitney buses, 136, and taxicabs, 147. In round figures the passengers carried per annum were as follows: Street cars, 75,500,000; automobiles, 54,000,000; jitneys, 4,500,000, and taxicabs, 1,300,000. The passengers per trip were as follows: Street cars, 35.3; automobiles, 1.8; jitneys, 3.6, and taxicabs, 1.4. Cost to the passenger of the various kinds of ride, in cents per mile, averages as follows: Street car, 2; automobile, 5.16; jitney, 4.26, and taxicab, 32.18. The apparent high rate charged by the taxicab is because nearly one-half of its mileage is while vacant.

The total cost to the users in the 7-mile zone of the various services is as follows: Street cars, \$5,139,000; automobiles, \$16,391,000; jitney buses, \$417,000, and taxicabs, \$742,000, or a total of \$22,689,000. Those who employed private automobiles paid three times as much, not including interest, for their 54,000,000 rides as it cost the 75,000,000 railway riders. This demonstrates two important points—first, the great demand for transportation, and, second, a willingness on the part of the public to pay well for the desired service.

A recent check in the business district showed 2,360 automobiles parked on the streets, 814 in open lots, and 1,478 in garages. Out of a total of 4,652 automobiles, slightly more than one-half were parked in the streets. With the acute congestion now existing it is evident that if the present business district is to retain its prestige, relief must be afforded, the capacity of its arteries increased, and its development expanded to meet the new requirements of a comprehensive co-ordinated plan of local transportation. Prompt and drastic action is necessary to afford the railway relief from its present plight and permit it to make extensions and improvements.

COST OF OPERATION

To ascertain the operations by individual lines, the total operating revenue was distributed proportionately to the passenger revenue, and the cost of operation, including taxes and renewals, was distributed on a basis

of passenger car hours operated, taking into consideration the car types.

Figures showed that 11 of the 23 lines failed to earn sufficient to cover even the operating deductions. A number of the others were perilously near a similar condition. The average of all the lines in 1923 showed a net earning of only about 5 cents per car-mile available for interest on the investment. Besides jitney competition the low average earning rate in Atlanta is due to duplication of service, slow speeds, congestion, unbalanced through routes, and long-haul suburban service, at low fare rates.

A comparison of the general operating statistics for the year 1924, partly estimated, as compared with those for 1923, is as follows:

STATISTICS FOR 1923 AND 1924, GEORGIA RAILWAY & POWER COMPANY—RAILWAY DEPARTMENT

	Year Ended Dec. 31, 1923	Year Ended Dec. 31, 1924
Population served (estimated).....	257,477	267,042
Total operating revenue.....	\$5,244,205	\$5,057,704
Total operating deductions.....	\$4,505,248	\$4,491,346
Operating ratio, per cent.....	85.80	88.60
Revenue per car-hour.....	\$3.49	\$3.40
Operating expenses per car-hour.....	\$3.00	\$3.03
Revenue per car-mile, cents.....	38.17	36.29
Operating expenses per car-mile, cents.....	32.79	32.23
Revenue per mile of track (gross).....	\$25,213	\$24,084
Passenger car-hours operated.....	1,499,223	1,486,543
Passenger car-miles operated.....	13,721,310	13,922,372
Revenue passengers.....	75,518,711	73,413,026
Transfer passengers.....	19,838,406	19,967,265
Total passengers.....	95,357,117	93,380,291
Ratio transfer passengers to revenue passengers, per cent.....	26.25	27.20
Ratio transfer passengers to total passengers, per cent.....	20.82	21.36
Revenue passengers per car-mile.....	5.51	5.26
Rates of fare—Cash.....	7 cents	7 cents
—Tickets.....	3 for 20 cents	3 for 20 cents
Average fare per revenue passenger, cents.....	6.81	6.76
Car-miles per car-hour.....	9.16	9.37
Miles of track operated.....	218	220

The above shows a decrease of over two million revenue passengers carried with an increase of 200,000 car-miles operated, or more transportation with less riders. The shrinkage in the volume of business is shown by the decline in the operating revenue of \$188,000, reducing the revenue per mile of track from \$25,213 to \$24,084. These low earnings per mile of track are an outstanding feature of the present unsatisfactory situation.

SUMMARY OF IMPROVEMENTS

To provide the city with adequate modern transportation facilities, many far-reaching changes will have to be made. One of the recommendations of the Beeler report is the construction of viaducts over two important downtown streets. These will then be two-level streets for short distances. It is proposed to cut through a new street for a distance of about three blocks, and to extend another for four blocks. Two connecting streets are to be widened to form a convenient route bypassing the so-called Five Points, the most congested intersection.

Sidewalk congestion is to be relieved by the construction of moving platforms underneath the present sidewalks on the most important north and south street as well as the most important east and west street. These moving sidewalks will be virtually subways without trains. From a stationary sidewalk underneath existing sidewalks pedestrians will step to a platform moving continuously at a speed of 2 m.p.h., then to a platform moving at a speed of 4 m.p.h. and, if a greater speed is desired, to a sidewalk equipped with seats and moving at 6 m.p.h.

One responsible agency to conduct a systematic plan

of co-ordinated local public transportation including street cars and high-grade bus service is recommended. To accomplish this it will be necessary for the Georgia Railway & Power Company to make extensive changes in present car routes. Segregation of street cars away from the principal vehicular traffic lanes in the downtown section will leave these streets free for vehicular traffic. Schedules should be revised and new cars purchased. For the present it is recommended that the railway establish two bus lines. Others can be added to meet the growing transportation needs of the city.

The total cost of all these improvements will be close to \$9,000,000. This will be divided roughly as follows:

Street openings and widening projects.....	\$2,500,000
Moving underground sidewalks.....	3,000,000
Viaducts and approaches.....	2,000,000
New track construction.....	500,000
Fifteen standard double-truck cars.....	210,000
Thirty double-truck one-man cars.....	360,000
Power-saving devices.....	25,000
Fifteen buses and garage.....	350,000
Total.....	\$8,945,000

Including the railway's share of viaduct cost amounting to about \$500,000, the company will be called upon to spend in the neighborhood of \$2,000,000. All of these expenditures will be of direct benefit to the car rider and will place the railway in a position to render service more efficiently than heretofore.

The railway's revenues are derived almost wholly from passenger receipts. Prior to April 14, 1919, the rate of fare was 5 cents. On that date it was increased to 6 cents and on Oct. 1, 1920, to 7 cents cash with 15 tickets for \$1. On July 1, 1923, the ticket rate was changed to three for 20 cents. This fare is still in effect except on two lines where a special 5-cent fare is charged. With these fares under present operating conditions 11 of the 23 lines are not making sufficient to pay operating expenses.

A number of important economies can be made without impairing the quality of service. By rerouting and rescheduling a daily saving of 447 motor car-hours, amounting to \$262,000 a year, can be effected. By substituting 74 trailer car-hours for motor car-hours an annual saving of \$13,500 will be made. One-man operation of 381 daily car-hours would save \$102,000. By the use of power-saving devices a reduction of \$75,000 in power cost can be made. These total slightly more than \$450,000.

Railway taxes should be readjusted. Paving assessments should be made only for the increased cost of the pavement, if any, on account of the presence of the track. Since 1902 the company has paid the city \$1,717,973 for paving charges, or an average of \$78,000 annually. Since 1920, with the higher prices and a rapid extension of the paving program, the average annual expenditure has been \$140,000. The outlay for 1924 is estimated to exceed \$200,000. These expenditures are constantly increasing the company's capital account, which results in additional charges for interest and renewals. At present the average annual cost of paving renewals is \$68,000 and the annual interest charges on paving are approximately \$120,000. There should be no gross receipts or special license taxes for the street car rider any more than for other riders. The abolition of the gross receipts tax will save about \$100,000 annually.

Under the new plan, with more efficient operation and unfair jitney competition eliminated, it is estimated

that the revenue will increase \$200,000. This coupled with the savings already referred to should increase the net earnings from about \$500,000 to \$1,200,000. Even at that, however, the railway will hardly earn sufficient to pay a fair return on its then value, which will be in the neighborhood of \$18,200,000. No provision is made by which the company recovers any past losses.

It is hoped, however, to secure additional traffic by changing the fare. A flexible service-at-cost plan is proposed. A barometric fund having its normal sum at about 5 per cent of the present annual gross revenue, or \$250,000, should be provided. Whenever the cost of service exceeds the gross revenue by more than 20 per cent of this fund, namely, \$50,000, reducing the sum to \$200,000, the next higher rate provided in the schedule should automatically become effective on the first day of the next calendar month and continue in effect for at least one month. Should the barometric fund exceed the normal sum by more than 20 per cent, the next lower rate should automatically become effective. In no event should the fare be changed more than once in 30 days and with not less than 5 days' notice. A table of possible fare plans follows:

	A	B	C	D	E	F	G	H
Cash fare.....	5	5	5	10	10	10	10	10
Token rate.....	6@25	6@25		4@25	4@25	3@25	3@25	
Transfers.....	F	C	P	P	C	F	C	P
Children under 12 and school children 3@10	3@10	3@10	3@10	5	5	5	5	5

F = Free. C = Free only with cash fare.

It is recommended that the new plan be inaugurated with Schedule D. This will give the regular rider an immediate reduction from 6½ cents to 6¼ cents, which is equivalent to 7 per cent. Transfers between car lines should continue free as at present. It is estimated that this schedule will afford the railway an average rate of fare of 6.64 cents as against the present 6.76 cents.

To provide a permanent incentive for efficient and economical operation, it is proposed that the allowable rate of return on the value of the railway be adjusted so as to penalize the company when the fares are raised by diminishing the rate of return and rewarding it when the fares are lowered. A sliding rate of return is proposed to accomplish this, as follows:

Fare Schedule	A	B	C	D	E	F	G	H
Allowable rate of return:								
Maximum per cent.....	9	9	8½	8	7½	7	6	5
Minimum per cent.....	..	8	7½	7	6½	6	5	..

With the adoption of Schedule D the allowable rate of return will be a maximum of 8 per cent, with a minimum of 7 per cent. Should the railway fail to earn the minimum rate under Schedule D, and Schedule E be adopted, the allowable rate of return would be reduced automatically to a minimum of 6½ per cent with a maximum of 7½ per cent, and so on. On the other hand, when the volume of traffic and greater efficiency of operations permit the adoption of a lower fare such as Schedule C, the allowable return would be increased to a maximum of 8½ per cent with a minimum of 7½ per cent, and so on.

Thus in the event that higher rates are necessary the railway will receive a lower rate of return. When lower rates of fare are brought about the allowable rate of return will be raised.

London Tries New One-Man Car

Single-Deck Type, with Automatic Exit Door,
Similar to Those Now Used in America,
Is an Innovation in England

A SINGLE-DECK one-man tramcar was demonstrated on Nov. 3 to representatives of the engineering press by the London United Tramways. Safety and increased speed are two main factors which were considered in the new type cars.

In 1922 C. J. Spencer, general manager, after a visit to America, where he inspected one-man cars, began experimenting with a car of that type on a cross-country route about 2 miles long between Brentford and Hanwell, on the western outskirts of London. The experiment proved satisfactory, though the car worked in with double-deck ones on the same route. As a result an improved type has been designed. Five cars are now being built for service on the same route, which connects at each end with main routes. No double-deck cars will be used on this route. Shuttle service will be maintained, with a much closer headway than that of the double-deck cars. Except on the lines of the London United Tramways, one-man tramcars have not been tried in Great Britain.

The car has many ingenious mechanical devices, which are common in America, but have not been widely adopted in England. The doors are operated pneumatically and work in unison with the steps. Passengers board at the front end of the car and leave at the rear, an automatic treadle controlling the action of the exit door and preventing passengers from entering there, the door closing automatically as soon as the passenger has stepped down and takes his foot off the step.

The doors are prevented from opening while the car is in motion by means of a valve which shuts off the air supply except when the car is practically stationary. A dead man's handle is used on the air brake control lever. When the motorman removes his hand the brakes are applied automatically and the power shut off, irrespective of the position of the controller or brake handle.

Fares are paid by the passengers upon entering the



This New Single-Deck One-Man Car Is Being Tried Out on the London United Tramways

car, the regular rates being established at 1d for a short haul and 2d for the whole run. The coin is dropped into the fare box and the operator issues the ticket, which is canceled by a foot-operated punch. A change-giving machine further expedites the issue of tickets. Fare collection takes about 3 seconds per passenger. A special ticket machine is now being designed which will speed up fare collection still more.

The interior of the car is enameled white and an improved system of illumination which distributes the light more evenly gives the car a very bright and attractive appearance. Comfortable spring seats are covered in brown leather. White washable hand straps are used, and in place of the usual bell cord, extending the length of the car, a number of mechanical push bells are provided.

The driver is furnished with a seat and two large window wipers insure clear driving vision. A further improvement is a lamp fitted immediately over the ticket issuing equipment, which is automatically lighted when the entrance door is open, and switched off when it is closed, so that at night the driver is not inconvenienced by reflection on the windshield.



At Left, the Car Interior Resembles Those in Use on American Street Railways. At Right, Automatic Devices Used Include an Unlocking Exit Door, a Dead Man's Handle for the Brakes and a Ticket-Issuing Machine

Massachusetts Towns Provide Their Own Transportation

The Towns of Athol, Orange, Greenfield and Montague Take Over Lines Abandoned by Original Owners, Forming Two Transportation Areas Under Act of 1920—One System Abandons Alternative Bus Line in Favor of Trolley—Some Details of the Enabling Legislation

THE first "Transportation Area" formed under the statute passed by the State Legislature of Massachusetts in 1920 was created in March, 1924, from a portion of the Northern Massachusetts Street Railway. Although the statute referred to sale or lease only by a majority of a board of directors, Justice Braley of the Massachusetts Supreme Court interpreted the statute as granting the same powers to a receiver. Justice Braley therefore authorized D. P. Abercrombie, the receiver of the company, to wind up its affairs to the best advantage.

As shown in the accompanying map, the greater part of the trackage in the less settled districts was abandoned and sold for junk. The most worth-while section was a route 6.76 miles long between Athol (population 10,000) and Orange (population 5,400). This was purchased for \$18,484 by the town of Athol following ratification by the voters on Feb. 4, 1924. Operation by the board of trustees, comprising five members, was begun on March 24, with W. W. Woodward as chairman. George Donley, assistant superintendent of the predecessor company, was chosen superintendent. A supplementary act had to be secured from the Legislature to permit Athol to operate the portion of the road which lies within Orange. The trustees have retained the cash fare of 10 cents and the token scheme whereby 12 tokens are sold for 50 cents, but with a minimum fare of two tokens for the first of the four zones.

It is obvious from the price paid for the property that the trustees will not have to worry much about overhead charges, although the sale did not include power equipment, inasmuch as the railway had been purchasing power for some years in this hydro-electric territory. The title of the undertaking is "Athol & Orange Transportation Area."

SECOND AREA IN GREENFIELD AND MONTAGUE CITY

The second and more important transportation area had its inception on May 24, 1924, when the citizens of Greenfield (population 15,500) and Montague City

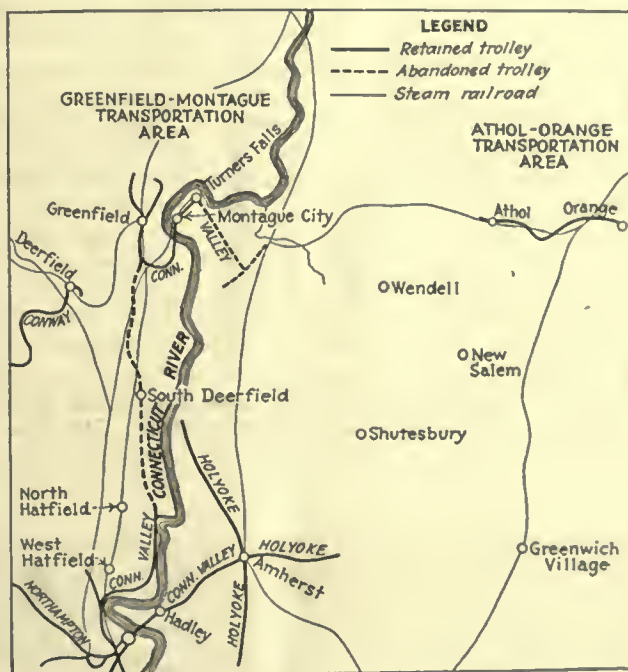
(population 7,600) voted at special town meetings to purchase 8.7 miles of track with cars and repair facilities for \$62,000 from the Connecticut Valley Street Railway. Of this sum, Greenfield paid \$42,966 and Montague \$19,034. Operation was begun by the Greenfield & Montague Transportation Area on Aug. 1, under a board of trustees comprising George W. Cary, chairman; Charles F. Mosher, secretary; J. B. Kennedy and Stuart Winch. As superintendent this board appointed F. A. Persons, who was formerly connected with the predecessor company.

The Greenfield-Montague board has retained the fares of 10 cents cash and 12 tokens for 50 cents, with a minimum fare of two tokens in the initial zone of this four-zone system. At one time, tickets brought 30 per cent of the revenue, but owing to the decrease in steady riders this ratio has dropped to approximately 5 per cent.

In this case the receiver obtained a price somewhat better than that for scrap because the portion taken over showed an operating surplus in 1923 of about \$12,000. In view of the small overhead charges, therefore, this transportation area has possibilities as a going concern. Outside of repainting the cars to an inviting orange yellow, the trustees have made but one other change of importance, viz., the abandonment of the alternative

motor-bus route to Turner's Falls. A word or two on this is in order.

The trackway distance to Turner's Falls is 4.8 miles, but the highway distance is only 3.14 miles. Advantage of this was taken by jitney operators as early as 1914, but it was not possible for the Connecticut Valley Street Railway to counter the move until November, 1919, following the passage of a law in 1918 which permitted street railways to operate motor buses. The installation of a reliable hourly and half-hourly service by Mr. Abercrombie disposed of this jitney competition and also permitted a cut in car-miles. This operation eventually resolved itself into a joint 30-minute headway by motor bus and trolley with the same fare schedule on the buses between terminals. The higher



Publicly Owned Transportation Areas Formed from Former Private Companies. The Track Abandoned Is Also Shown

intermediate fares were justified because of faster operation and the higher cost per seat-mile on the buses.

Since the towns themselves now own the street railway there is no fear of jitneys. Hence the alternative bus route has been abandoned in favor of a 30-minute headway on the trolley only. It is interesting that in the competition with the personal car in this territory, the newer motor buses had suffered more than the older trolley cars. It is stated that the number of riders is now only one-third of the traffic in the year 1917. This reduction may be due as much to the increase in fares as to the increase in automobiles.

The remainder of the Connecticut Valley Street Railway was disposed of as shown on the map, viz., the route between the Greenfield boundary and North Hatfield was abandoned, while the section North Hatfield-Hadley-Amherst was sold to the Northampton Street Railway.

An interesting sidelight on local transportation problems is afforded by the difference in public attitude toward bus or trolley in the three different Massachusetts areas once served by the same management.

In the territory of the Concord, Maynard & Hudson Street Railway the public permitted for 1 year a subsidy equal to taxes. When this was withdrawn, the railway was abandoned. Buses followed at once and have remained.

On the other hand, Athol and Orange were so opposed to buses that their trial was not permitted. It has already been noted that Greenfield and Montague deliberately threw out the alternative short-cut buses between Greenfield and Turner's Falls, although operated as part of the railway property. Finally, the local man who had purchased 9 miles of track extending from the Greenfield boundary through Deerfield and South Deerfield found that the public would stick to the bus. These differences in opinion are not ascribed so much to differences in service or the actual opinions of the majority, but rather to the mass in each town following the lead of a few who for one reason or another were either inclined to street cars or to buses.

PROVISIONS OF THE ENABLING LEGISLATION

The state of Massachusetts has a long and progressive record in public utility regulation. In the early days it was a pioneer in such matters as control of stock issues and earnings, which did much to keep the utilities of the state on a clean-cut financial footing in pre-war days. In more recent years it has fostered the public trusteeships of the Boston Elevated and Eastern Massachusetts properties. The transportation area statutes of 1920, under which the Athol-Orange and Greenfield-Montague properties were taken over, provided for public operation of electric railways in districts where they could not be operated profitably any longer under private ownership. It was not, however, until March, 1924, that advantage was taken of this statute, as previously described.

Section 143 of the transportation area statutes of 1920 states that one or more cities or towns may establish transportation areas for freight and passenger operation of street railways existing in their territory. With the approval of the voters, such a transportation area becomes a corporation vested with the rights and obligations under the general street railway laws that would apply to a privately owned railway, including regulation by the Department of Public Utilities. The

law provides that the term "Transportation Area" shall be included in the title.

Another section states that a city, by vote of its Council, subject to charter provisions, or a town by vote of its Selectmen, may make preliminary agreements with one or more railway companies for lease or purchase and operation of the properties. Such preliminary agreements are made binding upon the company following due hearing by the Department of Public Utilities, but subject to final acceptance by the voters. The department is responsible for the appraised value of the property, which shall be "upon the basis of the actual value at the time of appraisal, and not on the cost of replacement." Within 60 days after due advertisement of such a preliminary agreement and appraisal the voters are asked to decide if the agreement for public operation shall be accepted. If approved by a majority of the voters the mayors, city councils and selectmen may proceed to the final agreement, subject to a few reservations made by the Department of Public Utilities.

CONTROL VESTED IN TRUSTEES

According to the statutes (Section 146) the management and control shall be vested in a board of trustees, two of whom shall be chosen by the Mayor of each city concerned, with the approval of the City Council, and two by the Selectmen of each town concerned. These trustees are selected for 2-year terms, with an initial 1-year term for one trustee in each case. For a transportation area established by a single city or town a board of five members is to be appointed, one member being chosen annually. These trustees, who may be removed for cause, are not deemed public officers, and cannot incur personal liability as such. No stated salaries are provided, but they may be paid \$10 for each meeting attended, provided the total does not exceed \$300 a year. Stockholders of street railways affected are not eligible as trustees.

These trustees have full power to operate, lease or sub-lease a property, subject to approval by the Department of Public Utilities. They can appoint, compensate and remove officers, managers, and assistants. Upon the request of such a board the department shall take, by eminent domain, on behalf of the transportation area, all or part of a property which the company has ceased to operate for more than 90 days. This, of course, is subject to approval by the voters.

An important clause of the act (Section 150) provides that "the cities and towns comprising a transportation area shall contribute to the discharge of its liabilities and obligations on the basis of one-third part, according to the single-track street railway mileage within the town limits, one-third part according to their population, and one-third part according to their assessed valuation. The department shall establish the said basis at least once in three years."

Deficits must be made up by the different communities in proportion to their respective interests, and must be provided for in the tax levy for the year following the financial (calendar) year of the transportation area. Should there be a surplus, 85 per cent shall be distributed among the communities in proportion to their respective interests, the remaining 15 per cent being held as a reserve to meet possible deficits. In making the calculation, not less than 3 per cent nor more than 5 per cent of the book value of the property shall be charged off as depreciation.

For the purpose of acquiring street railways, the transportation area, with the approval of the Department of Public Utilities, may borrow money in excess of the statutory limit, but not exceeding 2 per cent of the assessed valuation. The trustees may also issue notes for current expense for terms not exceeding one year, subject to approval by the department.

The department has authority to exclude any community from a transportation area, but such exclusion shall not prevent the operation of street railways in or through its territory. The department may also permit a transportation area to operate into an adjoining state.

It is provided (Section 155) that the rental of a leased property shall not exceed 7 per cent of the price fixed in any option to buy. No lease shall be made for more than 5 nor less than 2 years, but a lease may be renewed if approved by the department as a matter of public necessity and convenience. Rentals shall be paid at least once in 6 months, and 4 months advance notice must be given to the owners of the property in case of a renewal of the lease. A lease may be terminated by consent of a majority of the stockholders, or by a majority of the voters to an election which is called upon petition of 10 per cent of the registered voters.

The fares established by the trustees, subject to the department's approval, shall be such as "will reasonably assure sufficient income to meet the cost of the service, including operating expenses, taxes, rental, interest, and the allowance for depreciation required," as previously mentioned. The trustees are required to maintain the leased property in good operating condition, so that if restored to the owner it must be in as good operating shape as when taken over, ordinary wear and tear excepted. A provision must be included in all leases, whereby any question of damages will be submitted to the department within 90 days from the date of expiration, and decision by the department shall be final.

As to taxation, it is provided that nothing in the act "shall affect the right of the Commonwealth, or any subdivision thereof, to tax the property owned or leased by a transportation area in the same manner and to

the same extent as if it were under private management, but cities and towns may abate in whole or in part the taxes thereon." This provision continues the railway subject to such state imposts as the excise tax of 1898, but allows it to be relieved of purely local burdens. It may be stated here that during the last 5 or 6 years the Connecticut Valley Street Railway and associated companies were tacitly relieved of paving assessments, because the communities realized the impossibility of getting blood out of a turnip.

963 Buses Ordered in 1924

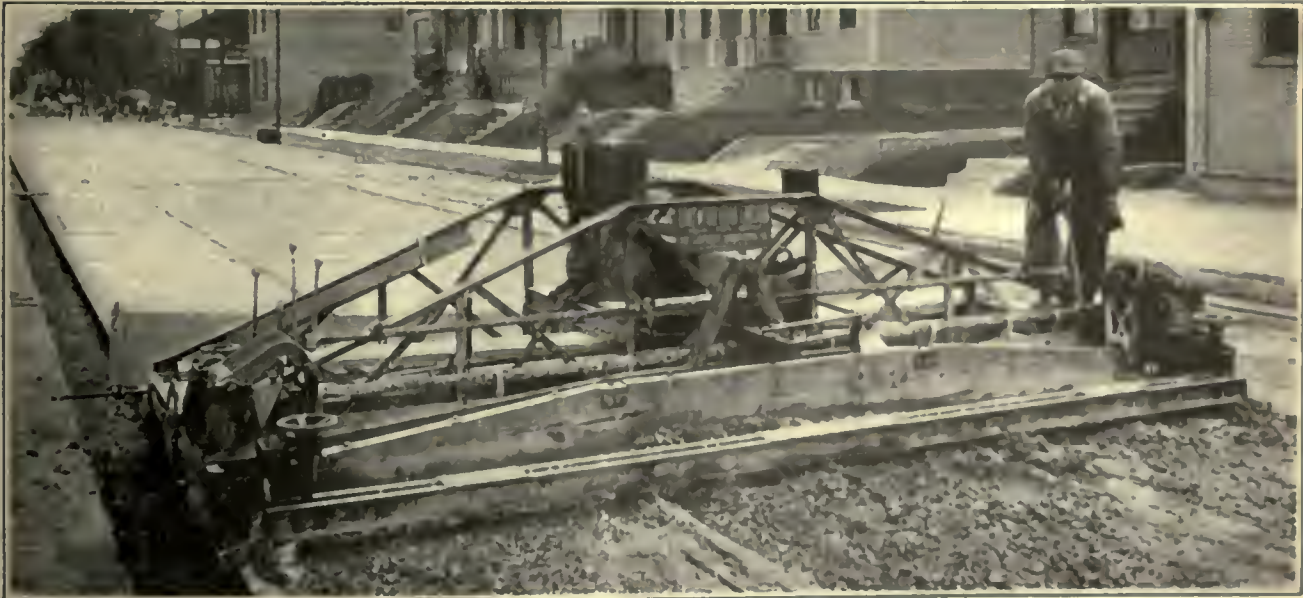
THE survey conducted by this paper covering the number of buses owned by electric railways and the number purchased during the past year shows a total of 963 ordered. This figure appeared incorrectly in the table published on page 8, issue of Jan. 3.

	Motor Buses Ordered	Trolley Buses Ordered	Other Automotive Equipment Ordered	Total
1922.....	240	6	112	358
1923.....	621	15	148	784
1924.....	963	7	105	1075
Increase 1924 over 1923....	342	8*	43*	291

*Denotes decrease.

Machine Speeds Up Concrete Finishing

THE latest addition to the equipment of the way and structures department of the Milwaukee Electric Railway & Light Company is a road finisher specially fitted to level and finish concrete pavement. The supporting wheels of this machine are so spaced as to ride on the outside rails of a double track. Four trowels are arranged to cut the flangeways on the insides of the rails. In other respects the machine is similar to those used for spreading, tamping and surfacing concrete highways. It is a self-propelled machine, being driven by a gasoline engine, with dual control levers, which allow it to be operated from either side. The operator rides the carriage as shown in the accompanying illustration. The apparatus was built by the Lakewood Engineering Company, Cleveland, Ohio.

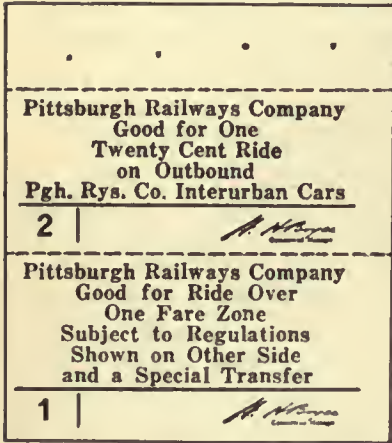


Hand Labor Finishing the Surface of Concrete Track Paving in Milwaukee Has Been Eliminated by This Machine

Coupon Books Arranged to Extend Transfer Privileges

TWO types of special tickets, one colored robin's egg blue and the other pink, have been adopted by the Pittsburgh Railways, with a view to extending the transfer privileges of passengers on the Harmony and Mars inter-

urban lines. One type of ticket is made up in pads of six leaves, each leaf consisting of three coupons. The first coupon is good from the suburban terminus of the Pittsburgh Railways into the city, and entitles the holder to a regular transfer such as is issued to city passengers. The second coupon is good on the return trip from any point reached by the transfer to a



This Style of Coupon Has Been Devised by the Pittsburgh Railways to Afford Special Transfer Privileges for Interurban Passengers

connection with the interurban route. A third coupon is accepted on outbound Harmony and Mars cars as far as the end of the Pittsburgh Railways line. The pads are sold to the public at \$1 each.

On Sundays there are special transfer privileges on a 10-cent cash fare instead of the 8½-cent token fare. A second booklet, containing five leaves of three coupons each, and selling for \$1, is designed to give the interurban passengers these special Sunday privileges. Assuming that the interurban passenger desires a transfer, this saves 16½ cents for a round trip on week days, and 13½ cents for a round trip on Sundays.

These books are intended only for the use of the regular patrons of the Harmony and Butler short-line route, and are sold only by the conductors on these cars, in order to prevent the excessive overcrowding which might result from the issuance of transfers on a regular token fare paid on these cars.

Emergency Valve for One-Man Cars

THE laws of Massachusetts require that all street railway cars operated by one man shall be equipped with apparatus to perform three distinct functions. There must be suitable arrangements so that any passenger, by pulling an emergency cord, can apply the

brakes, shut off the power, and release the doors. The device adopted by the Middlesex & Boston Street Railway to accomplish this consists of a three-way valve which normally provides connection from the air reservoir to the brake valve. When this is thrown to the emergency position by a passenger pulling a handle suspended from the roof of the car, air reservoir pressure is connected directly to the brake cylinder and to the circuit breaker and door unlocking mechanism.

The apparatus is located in a box suspended from the ceiling of the car. A pull cord hangs down where passengers easily can reach it. The outside of the box is labeled "For emergency only—to stop car pull cord." Pulling the cord rotates a handle attached to the valve and held in position by a spring. The rotation throws the spring over center and the valve is then held open by the same spring which ordinarily holds it closed.

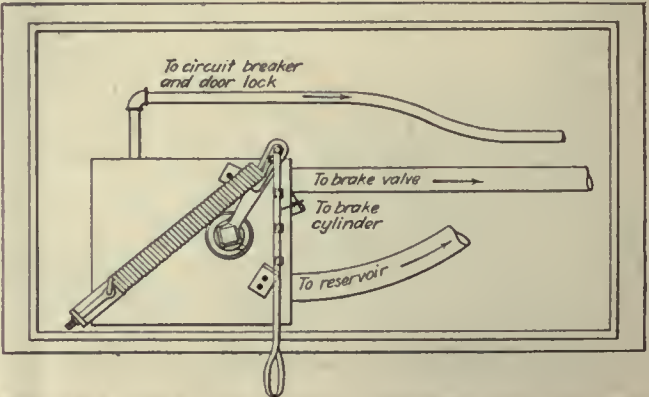
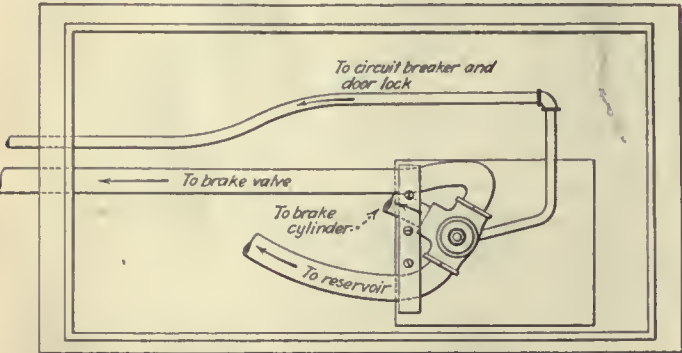
Railway Collects Souvenirs

THE articles in the accompanying illustration are not parts of a well-known make of automobile nor the contents of the gizzard of an ostrich who got his breakfast in a machine shop. They are the odds and ends, trinkets and gewgaws, dropped by passengers into the fare boxes of the pay-as-you-enter street cars of the Illinois Power & Light Corporation at Champaign, Ill. Among them are washers, combs, marbles,



Some Trinkets Found in Champaign Fare Boxes

safety pins, hairpins, keys, screws, nails, bits of glass, theater checks, nuts, bolts, lockets, pebbles, matches, tacks and a 38-caliber cartridge. Similar trinkets are found on all the city systems operated by the company.



Front and Back Views of Emergency Stop Device Designed by the Middlesex & Boston Street Railway for One-Man Converted Cars

Purchased Power for Illinois Central

Contract Between Railroad and Commonwealth Edison Company Provides for Supply of All Energy Required in Electrified Chicago Terminal Zone—Seven Substations, Totaling 40,500-Kw. Capacity, to Be Owned and Maintained by Edison Company

AN IMPORTANT step in the completion of its plans for electrification of the Chicago Terminal District was recently taken by the Illinois Central Railroad, which has entered into a contract with the Commonwealth Edison Company of Chicago, to supply all of the power requirements for this project. While the purchase of energy instead of its generation has become the generally favored practice among railways, this is one of the largest contracts of the sort executed up to the present time. Some of the general basic principles included in the new Illinois Central-Commonwealth Edison contract are of general interest as indicating recent practice in large power contracts of this type.

This contract is made for a term of 10 years, commencing Jan. 1, 1927, or any earlier or later date (not later than Jan. 1, 1928) with provision for four extension periods of 5 years each. The estimated load calls for an initial capacity of 40,500 kw. This will be converted in seven substations to be owned and operated by the power company. The substations are to be constructed upon property either owned or leased by the power company, or upon right-of-way of the railroad company. When located on the railroad right-of-way, a small nominal rental will be charged the power company, providing that at least 80 per cent of the substation capacity is used for the railroad requirements. The power company is given the right to distribute energy from the substations to other customers, but if in any year the amount of energy so distributed exceeds 20 per cent of the entire output of the station, provision is made for charging a higher rental for the property on which the station is located.

Energy will be supplied in three forms, i.e., (a) direct current at 1,500 volts nominal; (b) 60-cycle, three-phase, four-wire power at 4,000 volts nominal between phases; (c) 60-cycle power at such other voltages and phases as may be mutually agreed upon. The underground transmission and distribution lines for supplying the railroad energy requirements may be constructed on the railroad's right-of-way, and provision is made in the contract that the number, capacity and distribution of such lines will be such as to permit any one to be cut out without interrupting the delivery of the required amount of energy. Provision is also made to avoid fluctuations in potential of the direct current, which is to be delivered at a nominal voltage of 1,500. It is specified that this shall not exceed 1,550 volts nor be lower than 1,400 volts. Under normal conditions the frequency and voltage are not permitted to vary more than 5 per cent above or below the normal figures.

PROVISION FOR ADDITIONAL POWER

Under the terms of the contract the power company agrees to provide sufficient generating, transmitting and converting equipment at all times, but the railroad is required to give at least 12 months' written notice of any expected substantial increase in traffic or business

which may necessitate the installation of additional generating, transmitting or converting equipment.

The seven substations originally specified in the contract will be spaced at intervals of 5 to 7 miles along the railroad right-of-way. Provision has also been made for additional 1,500-volt direct-current substations where it may be found later that energy cannot be economically transmitted from the existing ones. Such additional stations will be installed upon written request from the railroad company, specifying the approximate location, the estimated amount of additional energy required and the approximate date of first delivery. Notice of new substation requirements must be given at least 12 months before operation is contemplated. The additional power required must be not less than 3,000 kw., and the railroad company is obligated to provide a site for the new station unless the power company has a site of its own available.

In the event that the contract is not extended for more than one 5-year period after the original 10-year term, provision is made to protect the power company from loss on its investment in substation apparatus. The railroad is then required to purchase all such apparatus which has been installed in any substation for supplying direct current for traction service. Even though the contract is extended for more than one 5-year period, the railroad company must purchase, at its termination, any apparatus which has been in service in substations for a period of 15 years or less, except that which the power company elects to use for other purposes. Under this clause of the contract the railroad has an option to buy any or all of the substation equipment, at the termination of the contract, which the power company has erected on the right-of-way of the railroad. The purchase price is to be determined by agreement between both parties, giving due consideration to replacement costs, obsolescence, normal depreciation and conditions with respect to repair and serviceability of buildings or equipment. If no agreement can be determined, the purchase price is to be referred to an arbitration board.

Extensions of the contract for terms of 5 years may be made by the railroad company four times, upon written notice one year in advance of expiration of the previous term. Even if such extensions run later than May 31, 1947, the contract is to terminate on that date, unless prior to that time the Edison Company is permitted by legislation to operate in at least as ample or broad a manner as at present.

DETERMINATION OF DEMAND

After the end of each calendar month, the railroad company's maximum demand will be determined by selection of the 3 hours from the specific month (one to be taken from each of three different days) in which the aggregate output of power is greater than that supplied in any other 3 hours in the month. One-third of the aggregate number of kilowatt-hours taken during the 3 hours selected is to be considered as the number

of kilowatts constituting the railroad company's maximum demand for that month, provided that in ascertaining the figure a period of abnormal demand has not been selected. If in any month every hour selected should be one of abnormal demand, the maximum demand for that month is to be the number of kilowatt-hours constituting the maximum demand for the last preceding month in which the maximum demand was ascertained as described. An abnormal period is considered to be one during which there is extra heavy railroad traffic, abnormally low temperature or other unusually severe weather conditions. In the event of abnormally heavy railroad traffic which continues beyond ten consecutive days in any month, the maximum demand will be determined as previously outlined, but will not be used in determining the load factor for that month. Should the total usable surplus generating, transmitting and converting capacity of the power company at any time be insufficient or unavailable to enable it to supply the railroad company a portion of the excess energy in an abnormal period, the railroad will be required upon notice by telephone or otherwise to refrain from drawing such portion of excess energy until notified.

BASIS OF ENERGY CHARGES

Rates for energy to be charged under the contract are made up on a sliding primary charge, based on maximum demand, and a sliding energy charge based on the number of kilowatt-hours drawn. The primary charge is the same for all demands up to and including 5,000 kw.; about 8 per cent less between 5,000 kw. and 10,000 kw. inclusive; about 13½ per cent less for 10,000 to 15,000 kw. inclusive, and 19 per cent less for demands in excess of 15,000 kw.

The energy charge, expressed in mills per kilowatt-hour, is the same for consumptions up to and including 5,000,000 kw.-hr. per month. It is about 0.8 per cent less for consumptions between 5,000,000 kw.-hr. and 7,500,000 kw.-hr. inclusive, and 1.5 per cent less for consumptions in excess of 7,500,000 kw.-hr. The secondary or energy charge is based on 10,500-B.t.u. coal at \$4 per ton and is subject to increase or decrease depending upon the average cost and heating value of coal. Whenever the average cost of the coal or its calorific value departs from this basis for any month, the energy charge will be calculated according to the following formula:

$$\begin{aligned} \frac{\text{Cost} \times 10,500}{\text{heat units}} + 2.5 &= \text{Mills per kilowatt-hour for consumptions up to and including 5,000,000 kw.-hr. per month.} \\ \frac{\text{Cost} \times 10,500}{\text{heat units}} + 2.45 &= \text{Mills per kilowatt-hour for the excess over 5,000,000 kw.-hr. and up to and including 7,500,000 kw.-hr. per month.} \\ \frac{\text{Cost} \times 10,500}{\text{heat units}} + 2.4 &= \text{Mills per kilowatt-hour for the excess over 7,500,000 kw.-hr. per month.} \end{aligned}$$

In this formula, the cost is the weighted average cost per ton to the power company of all coal delivered to it during the preceding 12 months, including freight, switching and car service charges and the cost of storing and handling the coal. No increase in the secondary energy charge becomes effective unless such increase is consistent with a contemporaneous general change in the cost of mining coal in the states of Illinois, Indiana and Kentucky, and in the cost of transportation of coal to Chicago. No adjustments due to change in calorific

value are to be made unless the B.t.u. per pound exceeds 11,000 or falls below 10,000.

The railroad guarantees that during each month of the contract the total consumption of energy in kilowatt-hours will not fall below 30 per cent of the equivalent of its maximum demand, and that its total aggregate payment will not be less than such a load factor would require.

PROVISION FOR METERING ENERGY

Meters for determining the maximum demand and energy consumption are to be installed by the power company at its own expense. The energy is considered to be delivered to the railroad at the point where the feeders leading from the substations intersect the railroad company's right-of-way. All watt-hour meters will be tested and calibrated monthly in the presence of representatives of both parties when desirable, and any meter found to be not more than 1 per cent away from normal is to be considered correct. If any meter exceeds this limit of accuracy, readings will be corrected by the per cent of inaccuracy found, but no correction will extend back beyond 30 days previous to the finding of the inaccuracy. If any meter is tested at the request of the railroad company and the registration is found within 2 per cent of accurate, the railroad company will be required to bear the expense of the test. All other tests are to be made at the expense of the power company.

INTERRUPTIONS OF SERVICE

In case of interruption or failure of power supply, the primary demand charge for that month is to be proportionately reduced, and if the inability to supply energy causes the railroad's load factor to fall below the guaranteed amount, the railroad is relieved of the guarantee for the corresponding month and the average secondary charge is not to be made at a higher rate than the average secondary charge during the preceding normal month. Furthermore, if the railroad is prevented from operating regular train service due to causes beyond its control, the minimum load factor of 30 per cent is not to apply for this period. The minimum load factor will apply only during those days in which the railroad has not been prevented from operating its regular service.

The contract also stipulates a recognition on the part of the power company that the railroad must receive regular uninterrupted service, and provision has been made whereby the railroad can cancel the contract if trouble with the character of service is not remedied within 90 days from the date of complaint. However, the railroad is required to give the power company 30 days notice in writing of its intention to cancel the contract, stating the date of its proposed termination. If this is done, the contract is to terminate upon the date when the railroad company is able to obtain elsewhere energy necessary for the operation of its lines. Until such date, the power company is required to supply energy in accordance with the terms of the contract.

If at any time the power company supplies energy to any other railroad, at a lower rate which is not justified by different conditions of service, making the cost of production and distribution to the other consumers relatively less than to the Illinois Central Railroad, the latter is to be entitled to a reduction in its rates equal to that portion of the difference as shall not be justified by the difference in conditions.

In case of any railroad accident or abnormally heavy railroad traffic, the railroad company is required to give the power company immediate notice by telephone or otherwise. At the termination of such abnormal periods the parties to the contract are to agree, if possible, on the duration of the abnormal period and if they are not able to agree within 10 days the subject is to be submitted to arbitration.

ARBITRATION BOARD

Any differences of opinion arising between the two parties with respect to their rights and obligations, which cannot be settled otherwise, are to be referred to a board of arbitrators, consisting of three disinterested persons. One is to be chosen by each of the parties. These two are to select a third arbitrator. If they cannot select a third member within 20 days after their appointment, the third arbitrator is to be chosen by the senior judge of the United States District Court of the eastern district of the northern division of Illinois. In case the railroad company disputes and desires to submit to arbitration any bills rendered by the power company, the railroad will be required to pay those bills within 30 days without prejudice toward its rights to recover any sum which the decision of the arbitrators may find to be overpayment, with interest at 6 per cent. Compensation of the arbitrators is to be paid in equal parts by the two parties to the contract.

Buses Link Industrial with Residential Section

Two Buses Replace Shuttle Car Service in Rensselaer, N. Y., and Provide Extensions to Sections Not Previously Served

AN ORDINANCE permitting the operation of buses by the Capital District Transportation Company, Inc., a subsidiary of the United Traction Company, Albany, N. Y., was adopted by the Common Council for the city of Rensselaer in June, 1924. Operation began on Sept. 24. This bus operation replaces a shuttle service which was furnished by an electric car line in Rensselaer. At the same time the line was extended to the south a little over $\frac{1}{2}$ mile to reach an industrial district which was previously without transportation

service, and to the north it was extended for nearly a mile to include a residential section. Industrial and residential sections are thus joined so that the service is improved over that originally furnished by the car line. The buses have been routed during certain hours of the day along East Street, to reach a school and a church in that section and also to serve residents who were without transportation. This latter routing is experimental. It is being done to make certain whether

DIMENSIONS AND EQUIPMENT DETAILS OF RENSSELAER BUSES

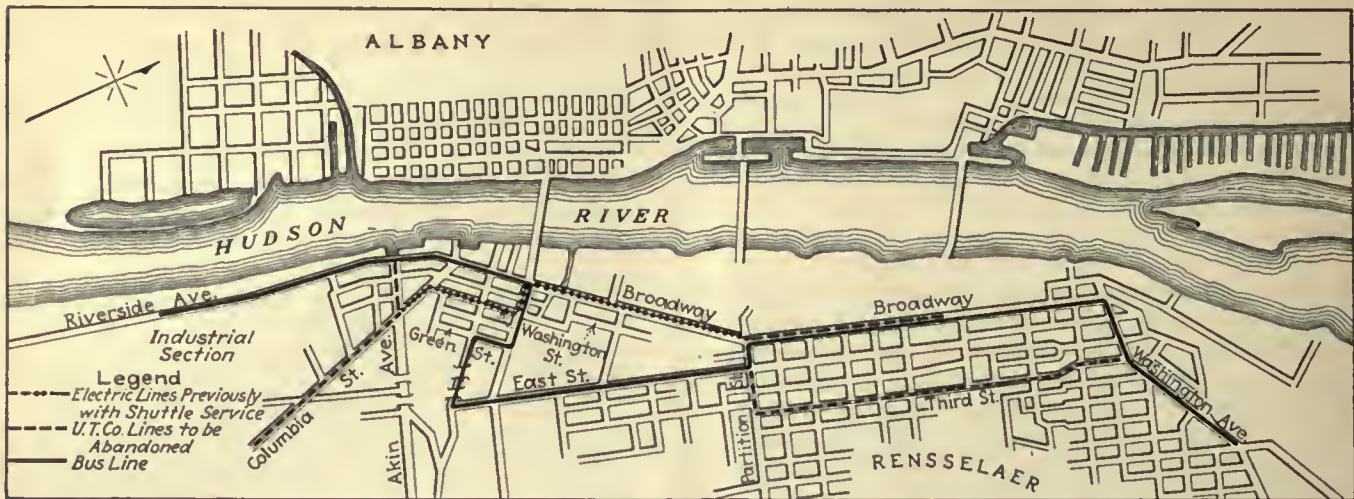
Operating company	Capital District Transportation Company
Number of buses in this service	2
Chassis	Pierce-Arrow Model Z
Wheelbase	196 in.
Front tread	68 in.
Rear tread	89 in.
Turning radius inside wheels	27 ft. 6 in.
Wheels	Budd-Michelin
Tires	General Pneumatic cords 36x6, dual rears
Engine	4-in. bore, 5 $\frac{1}{2}$ -stroke
Ignition system	Delco, double
Engine starter	Delco
Lubrication system	Alemite
Axle bearings	Timken
Brakes	Service on drive shaft, emergency on rear wheels
Body manufacturer	Bender Body Company
Type body	Pay-enter
Length over all	16 ft. 4 in.
Height inside	6 ft. 4 in.
Width inside	6 ft. 10 in.
Seating capacity	25
Seats	Hale-Kilburn 208 de luxe
Seating material	Spanish leather
Interior trim	Mahogany
Headlining	Exposed carlines, white enameled
Roof material	Canvas
Window guards	Outside, stationary
Ventilators	Nichols-Lintern
Signal system	Faraday
Destination signs	Hunter, roller
Doors	Folding, hand operated
Heater	Exhaust
Lamps, interior	Six 21 candlepower
Fare registers	Ohmer
Rails and straps	Porcelain with sanitary grips
Emergency door	At rear right hand side, mechanically controlled from driver's seat
Painting	Red body, cream trimmings, buff roof

or not the traffic warrants service through this section. If it does, the car routes can be rearranged readily.

An accompanying map shows the route of the bus line as it is now operated and also the shuttle service which was previously furnished by the electric cars. The portion of the line along Broadway between the Hudson River bridge and Partition Street is also served by cars which cross the bridge from Albany. As the tracks on Third Avenue, Washington Street and Columbia Street are still traversed by cars of the Albany Southern Railroad operating between Albany



New Buses Used to Give Improved Service in Rensselaer, N. Y.



Map of Rensselaer Showing Bus Line and Electric Line Previously Operated as Shuttle

and Hudson, N. Y., the only part of the electric line to be abandoned is a section along Broadway north of Partition Street and a short section along Akin Avenue.

At present two buses are used for the service. These have bodies made by the Bender Body Company, mounted on Pierce-Arrow Motor Car Company's model Z chassis. The buses, which are of the pay-enter type, seat 25. The accompanying table gives the principal dimensions and details of construction.

Where possible, the various items of equipment used on these buses are the same as those used on the trackless trolley vehicles operated by this company in Cohoes, and which were described in the Dec. 13 issue of *ELECTRIC RAILWAY JOURNAL*. Particular attention has been given to providing an attractive and comfortable bus throughout. The Hale & Kilburn type 208 de luxe seats give comfortable riding, and a clear height inside of 6 ft. 4 in. gives headroom for standing passengers. Special attention has also been given to providing an efficient lighting system. The illumination at night is furnished by six 21-cp. lights. An emergency door on the rear right-hand side is mechanically controlled from the driver's seat. The exterior painting is standard United Traction Company's color design with red body, cream window posts and buff roof.

Fifty Reasons for Traveling Traction

AN ADVERTISING campaign is being conducted by the Indianapolis & Cincinnati Traction Company in five daily newspapers along the line. One good reason for "traveling traction" is given in each advertisement. The same heading is used all the time in all the papers. The first appearance was on Sept. 1, and one advertisement was published every second day, after that time. In all, 50 were published, ending Dec. 26. Among the reasons presented are the following:

It is a problem to find parking space in Indianapolis. A man saves lots of time leaving his auto at home when he goes to the city.

The I. & C. makes a real low rate on Sunday. A fine thing for the fellow who works all week and wants an outing on Sunday. Only a dollar between any two stations on either division.

The cars carry fresh ice water. This is a little thing but it means a lot in hot weather, and the I. & C. coolers are according to government regulations, with the ice separate from the water.

The I. & C. has careful, well-trained men. They are making a wonderful record for safe operation.

The I. & C. is a Hoosier institution, home managed—home owned, a vital part of the community.

Everybody prefers to ride steel cars. All of the new I. & C. cars are steel.

The interurban lets the city man live in the country and the country man work in the city. It is so easy to go back and forth every day.

The train schedule is dependable all the year around. The cars run rain or shine, snow or sleet, and maintain splendid service.

The I. & C. has low commutation rates for the daily traveler. The rate from here to Indianapolis is only — cents.

The traffic rules in Indianapolis change so fast it is hard to keep out of jail. So much easier to leave the auto at home and take the traction.

The traction line checks 150 lb. of baggage free and a man can take almost any amount of excess right along with him, usually on the same car.

The I. & C. trainmen are always courteous and thoughtful in helping elderly people and children. They never run off and leave you, either.



"TRAVELING?"
"Yes,—Traction!"
"Why?"

The regular Interurban fare is 20% less than the railroad fare. This means a lot to a frequent traveller.

Reason No. 6

44 other reasons!
Indianapolis & Cincinnati Traction Co.

This Heading Is Used In All the Papers All the Time In the Advertising Campaign of the I. & C.

The I. & C. cars have such broad, roomy, comfortable seats. There is plenty of leg room, too—comfort for both tall and short.

A man can put in a busy day, catch the traction and get all cleaned up before he gets home. The toilet facilities on the cars almost equal a Pullman. Plenty of room.

The I. & C. cars are kept clean. Ever notice that there is no noisy fare register; no cash fare receipts littered on the floor? Even the bell cord is strung along the side of the car. The cars must be cleaned daily.

Too many driving hazards—fool driver—speed fiends at cross roads—road hogs. The interurban is safe. No worries about getting your auto stolen either.

Clearing Trouble on Underground Feeder Sections*

A COMPLETE set of general instructions for the clearing of trouble on underground feeder sections has been completed during the year by the United Railways & Electric Company of Baltimore, Md. This has been prepared by Adrian Hughes, Jr., superintendent of power, in co-operation with his foremen. The instructions give in detail directions for the manner of procedure on every section of the company's lines in case of trouble. The instructions for each section embody a number of tests to determine the location of the break or seat of trouble. The first test in each instance is for the cause which experience shows would be most likely to be responsible for trouble in that section. The second test is for the next most likely cause, and so on.

These instructions in handling grounded sections are intended to be of aid in locating and correcting trouble quickly. Such instructions cannot be written for every specific case, and it is, therefore, necessary to cover in a general way all cases of trouble that can be foreseen. The linemen, of course, are supposed to use their judgment in applying the instructions and to be guided by the results obtained from the different steps.

The general rule for grounded sections is first to inspect the overhead portion of the section, i.e., the trolley wire and the overhead feeder; and then to separate the underground portion of the section, i.e., the underground feeder, beginning as near the middle point as possible. In this way the various portions of the section will be eliminated until the trouble is found.

A test lamp is considered useful in this work. The testing outfit consists of either a single lamp in series with a suitable resistance, or a five-light cluster, so

that it can be safely connected between a source of 600-volt energy such as the trolley wire, or a live feeder or switch and the ground. By connecting to such a source of energy and touching the test point to a cable which has been separated from the rest of the circuit, it is possible to determine whether or not this cable is grounded. If the lamps light the cable is grounded, and if they do not light it can usually be assumed to be in good condition. The testing outfit should always be tried out before and after making a test to be sure a lamp is not burned out or other trouble developed in it. For instance, after connecting the lamp to a source of energy such as a live trolley wire or a live switch it should be connected to a known ground such as the rail or a negative wire. If the lamp lights and burns at normal brilliancy it shows the testing outfit is in good condition. It then is safe to make the test on the underground cable or other portion of the circuit. Upon completion of the test the test point should again be touched to the ground to be sure the testing outfit is in good condition and did not give a false indication.

The distributing lines in Baltimore are divided into some 70 sections, designated by the name of the street or portion of the street where the feeders are located. Specific instructions have been worked out for each section, the conditions having been studied carefully so that there is little opportunity for guesswork on the part of the tester as to the proper procedure to make to locate trouble. The instruction sheets for several of the sections which follow indicate the general form.

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee, of the American Electric Railway Association by the company named.

Baltimore Street Section Central Substation No. 3

First go over trolley wire.

If No Overhead Trouble Is Found:

CABLE No. 8—Open switch on cable No. 8 on pole south side Baltimore Street opposite east B/L Charles Street. Have substation test No. 8 cable.

If No. 8 is GROUND—Have substation cut out No. 8 cable and close breaker.

If No. 8 is CLEAR—Close switch on cable No. 8 and proceed to Baltimore and Eutaw Streets.

CABLE No. 52—Open switch on cable No. 52 on pole south side Baltimore Street 50 ft. east of east B/L Eutaw Street. Have substation test cable No. 52.

If No. 52 is GROUND—Have substation cut out No. 52 cable and close breaker.

If No. 52 is CLEAR—Close switch on cable No. 52 and proceed as follows:

CABLE No. 116—Open all switches on cable No. 116 located on south side Baltimore Street as follows: east of Paca Street—50 ft. east of Eutaw Street—southeast corner Sharp Street—opposite east B/L Charles Street—southeast corner Light Street.

Test No. 116 with test lamp at either Charles Street or Eutaw Street.

East Baltimore Street Section Pratt St. D. C. Board No. 4

If Two Crews Are Available, One at Caroline Street and One at Lombard Street: CAROLINE STREET CREW—Starting at Baltimore and Caroline Streets proceed east to Broadway and south to Gough Street. If no overhead trouble is found, return over section to meet other crew.

LOMBARD STREET CREW—Starting at Baltimore and Calvert Streets proceed east to Caroline Street. If no overhead trouble is found, continue over section to meet Caroline street crew.

If No Overhead Trouble Is Found by Either Crew:

CABLES No. 15 AND No. 24—Lombard Street crew shall open switches at Baltimore Street and Market Place on cables Nos. 24, 63 and 64 and switch at Baltimore

and Holliday Streets, on cable No. 15. Call Pratt Street D. C. Board to test cables Nos. 15 and 24. If either, or both of these cables test clear, close switches at Holliday Street and at Market Place but do not close switches on Nos. 63 and 64 until all switches have been opened and cables tested with test lamp.

CABLES No. 63 AND No. 64—Caroline Street crew after meeting Lombard Street crew will open switches on cables Nos. 63 and 64 at the following locations: Broadway and Gough Street, Broadway and Pratt Street, Broadway and Baltimore Street, Baltimore and Caroline Streets, Baltimore Street and Central Avenue, Baltimore and High Streets.

Return to Baltimore and Caroline Streets, close cross-connecting switch with Caroline Street section. Then test cables Nos. 63 and 64 with test lamp at this location. If either, or both of these cables show clear, close in switches on clear cable at the location given above and then meet Lombard Street crew at Baltimore Street and Market Place.

If cable No. 24 is O.K. and has been closed in, close switches on either No. 63 or No. 64, or both, if they are O.K. at Baltimore Street and Market Place.

If Only One Crew Is Available:

First go over trolley wire.

If No Overhead Trouble Is Found:

Return to Baltimore Street and Market Place and proceed as above for cables Nos. 15 and No. 24. Then follow procedure for cables No. 63 and No. 64.

Belair Road Section

Northern Substation No. 7

First go over trolley wire.

If No Overhead Trouble Is Found:

CABLES Nos. 84, 85 AND 163—Open switches on Belair Road as follows: Nos. 84 and 85 at northwest corner of Brehm's Lane, No. 163 at southwest corner of Brehm's Lane, Nos. 84 and 85 at Clifton Park gate, Nos. 84 and 85 at No. 2346, Nos. 84 and 85 at Lyndale and 84 and 163 at Ravenswood Avenue.

Have operator at Northern substation test cables and close switches on clear cables.

Boulevard Section

Northern Substation No. 7-1

First go over trolley wire, observing the following route. St. Paul Street to 31st Street, to Greenmount Avenue, back to University Parkway, then open switch that controls the Guilford extension. If power comes on it indicates trouble on Guilford extension. Continue over University Parkway to Roland Avenue, then south to Overhill Road to Charles Street Avenue, to Guilford terminus, then south to University Parkway.

If No Overhead Trouble Is Found:

CABLE No. 154-A—Open switches on cable No. 154-A, located on St. Paul Street at 31st Street, at 29th Street, and at 26th Street.

If Section Does Not Clear Up:

CABLES Nos. 154 AND 155—Open switches on cables Nos. 154 and 155 at northwest corner of Greenmount Avenue and 31st Street.

Then call operator at Northern substation. If operator reports section as still grounded, send driver to St. Paul Street and University Parkway to close switch that controls Guilford extension, and also to Roland Avenue to close tie line switch with Roland Park section. This will make Boulevard section alive. The driver will then meet the lineman at Greenmount Avenue and H. & O. right-of-way, where cables Nos. 154 and 155 are to be opened and tested with test lamp.

If Nos. 154 and 155 Test Clear:

CABLES Nos. 106 AND 107—Go to Exeter Hall Avenue and open switches on cables Nos. 106 and 107 and have operator at Northern substation test these cables, after which close in on clear cable, notifying operator to do the same. Then close tie line switch between Boulevard, Roland Park and St. Paul Street section at Exeter Hall Avenue. Then go to York Road and H. & O. right-of-way and Greenmount Avenue and 31st Street and close switches on cables Nos. 154 and 155. Then test cable No. 154-A and if clear, close switches on it.

Then go to Roland Avenue and open tie line switch with Roland Park section.

American Association News

Claims and T. & T. Committees for 1925

THE committee appointments of the Claims Association and of the Transportation and Traffic Association for the current year have now all been made. Invitations have been sent out to the members given in the following list, and acceptances have been received from all but a few of those named. An additional committee on engineering symbols which has been appointed in the Engineering Association is also included below.

It is expected that committee appointments in the Accountants' Association, as well as additional American Association committees, will be announced in the near future.

Claims Association

ACCIDENT PREVENTION

(Joint Committee with T. & T. Association)

C. B. Hardin, general claim agent United Railways of St. Louis, St. Louis, Mo., co-chairman.

J. H. Handlon, San Francisco, Cal.
S. G. Shaw, Denver, Col.
H. H. Barnard, Birmingham, Ala.
J. S. Harrison, Jacksonville, Fla.
L. F. Wynne, Atlanta, Ga.
G. R. Whitmore, Peoria, Ill.
T. C. Neilson, East St. Louis, Ill.
Wallace Muir, Lexington, Ky.
J. G. Bruce, Indianapolis, Ind.
E. J. Paige, Baltimore, Md.
W. H. Hyland, Gloversville, N. Y.
C. W. Giltner, Detroit, Mich.
H. E. Cady, Utica, N. Y.
R. A. Sears, Boston, Mass.
Samuel Riddle, Louisville, Ky.

EMPLOYMENT

W. G. Marshall, superintendent claim department, Pittsburgh Railway, Pittsburgh, Pa., chairman.

Neil Funk, Louisville, Ky.
C. M. Roberts, Los Angeles, Cal.
H. L. Osgood, Springfield, Mass.
A. E. Shaw, Montreal, Canada.

MEDICAL AND SURGICAL WORK

F. L. Mosser, surgeon Third Avenue Railway, New York, N. Y., chairman.
George Lorenz, Chicago, Ill.
E. W. Miller, Milwaukee, Wis.
Daniel Strock, Newark, N. J.
J. A. Watts, San Antonio, Tex.

RESOLUTIONS

William Tichenor, claim agent Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., chairman.

D. M. Finch, Des Moines, Ia.
A. G. Jack, Wilmington, Del.
A. F. Solms, Savannah, Ga.

SUBJECTS

J. J. Reynolds, claims attorney Boston Elevated Railway, Boston, Mass., chairman.

S. A. Bishop, Los Angeles, Cal.

W. H. Hyland, Gloversville, N. Y.
F. S. Macy, Brooklyn, N. Y.
Wallace Muir, Lexington, Ky.
E. J. Paige, Baltimore, Md.
C. E. Redfern, Providence, R. I.

Transportation and Traffic Association

ACCIDENT PREVENTION

(Joint Committee with Claims Association)

C. W. Chase, president Gary Street Railway, Gary, Ind., co-chairman.
M. W. Bridges, Chicago, Ill.
J. F. Egolf, Aurora, Ill.
Arthur Gaboury, Montreal, Canada.
J. A. Jarvis, Chicago, Ill.
A. W. Koehler, Rochester, N. Y.
R. L. Lindsey, Durham, N. C.
G. H. McFee, Framingham, Mass.
A. B. Miles, St. George, S. I., N. Y.
R. M. Reade, Quebec, Canada.
C. F. Schmidt, Indianapolis, Ind.
R. J. Smith, Davenport, Iowa.
Samuel Riddle, Louisville, Ky.
George Theis, Jr., Wichita, Kan.

BUS OPERATION

A. H. Ferrandou, executive assistant Washington Railway & Electric Company, Washington, D. C., chairman.
B. W. Arnold, Milwaukee, Wis.
D. C. Barnes, Boston, Mass.
C. H. Chapman, Waterbury, Conn.
F. A. Cummings, Boston, Mass.
E. D. Dreyfus, Pittsburgh, Pa.
M. L. Harry, Decatur, Ill.
D. J. Locke, Newark, N. J.
J. W. McCloy, Syracuse, N. Y.
H. A. Mullett, Milwaukee, Wis.
D. A. Scanlon, Akron, Ohio.
O. A. Smith, Los Angeles, Cal.
R. H. Smith, New York, N. Y.
J. B. Stewart, Jr., Youngstown, Ohio.
J. V. Sullivan, Chicago, Ill.

SELLING TRANSPORTATION

W. E. Wood, local manager Houston Electric Company, Houston, Tex., chairman.

W. M. Bird, Paducah, Ky.
J. R. Blackhall, Joliet, Ill.
J. A. Dewhurst, Philadelphia, Pa.
H. Etheridge, Harmony, Pa.
C. A. Graves, Olean, N. Y.
J. P. Griffin, Dallas, Tex.
C. F. Handshy, Springfield, Ill.
W. W. Holden, San Antonio, Tex.
H. G. Monger, Milwaukee, Wis.
C. D. Smith, New Brighton, Pa.
Bert Weedon, Indianapolis, Ind.
E. S. Wilde, New Bedford, Mass.
W. H. Boyce, Pittsburgh, Pa.

TRAFFIC CONGESTION

G. B. Anderson, manager of transportation Los Angeles Railway, Los Angeles, Cal., chairman.

W. E. Thompson, superintendent of transportation Third Avenue Railway,

New York, N. Y., vice-chairman.
W. S. Bell, Wilkes-Barre, Pa.
R. C. Brooks, Savannah, Ga.
S. C. Dows, Cedar Rapids, Ia.
D. L. Fennell, Kansas City, Mo.
J. A. Greig, Chicago, Ill.
J. E. Heberle, Washington, D. C.
F. R. Latta, Syracuse, N. Y.
W. H. Maltbie, Baltimore, Md.
A. R. Myers, Erie, Pa.
J. P. Pope, Lexington, Ky.
E. S. Rider, Detroit, Mich.
J. P. Tretton, Indianapolis, Ind.
P. E. Wilson, Cleveland, Ohio.

Engineering Association

ENGINEERING SYMBOLS

H. R. Stamm, architect the Connecticut Company, New Haven, Conn., chairman.

H. W. Coddington, Newark, N. J.
R. C. Cram, Brooklyn, N. Y.
E. L. Lockman, Boston, Mass.
J. F. Neild, Toronto, Canada.
C. W. Squier, New York, N. Y.

Executive Committee

THE executive committee of the American Electric Railway Association met in regular meeting in New York on Jan. 7. Members present were President J. N. Shannahan, Secretary J. W. Welsh, R. P. Stevens, C. E. Morgan, W. H. Sawyer, J. H. Hanna, T. C. Cherry, J. P. Barnes, C. H. Clark, C. S. Hawley, E. P. Waller, A. A. Hale, E. F. Wickwire and M. B. Lambert.

Reports were heard from the various standing committees. Approval was given the work done by a special committee in engaging new headquarters for the association beginning May 1.

Speaking for the committee on publicity, Mr. Barnes urged that the members of the association and the association itself give thorough co-operation in following up the work of the National Conference on Street and Highway Safety, which was called by Mr. Hoover. Mr. Barnes also gave a brief report of the activities of this conference and expressed the view that it had resulted in the most instructive and conclusive statement for guidance in the street and highway traffic situation that has ever been compiled. He thought that this conference had started a humanitarian and altruistic movement of great importance. The statement referred to was presented in ELECTRIC RAILWAY JOURNAL, issue of Dec. 20, 1924, page 1042, together with editorial comment pointing out certain aspects of the work done by the conference, page 1021.

A set of principles drawn tentatively by the committee on co-operation with the motor vehicle industry to express the policies of the American Electric Railway Association with respect to the bus was read to the executive committee.

tee but no action taken at this meeting. The committee also discussed at some length the need for legislation to bring interstate operation of motor bus lines under the jurisdiction of the Interstate Commerce Commission. No definite step was taken, the object being merely to get an expression of view in respect to this problem. There was unanimity of opinion that the Interstate Commerce Commission should be given jurisdiction over such common carrier operation.

President Shannahan read a report of the Coffin prize committee in which suggestions had been made to the Coffin Foundation for extending somewhat the basis of award. A communication from the Foundation stated several reasons why it was deemed undesirable to make any changes in the plan this year.

The next meeting of the committee will be held in Washington on Monday, Feb. 16, at 10 a.m., in the United States Chamber of Commerce building.

Way Committee

A GENERAL outline of the work to be undertaken by the various sub-committees was considered at a meeting of the way committee, in New York, on Dec. 18-19. Among the subjects of interest discussed was the question of substitute ties. The committee suggested that the sub-committee analyze the results of last year's questionnaire, and follow up the various member companies and manufacturers who are in a position to furnish data. It was the consensus of opinion that the sub-committee should endeavor to design a suitable substitute tie for track in paved streets. Later a design of tie for open track construction can be studied. Considerable discussion took place concerning ways to reduce the noise of car operation. It was thought that the greater part of the noise could be attributed to the condition of the cars. Comparative noise of operation over monolithic steel tie track structure and other forms of ballasted track will be investigated.

During the discussion of welded rail joints, C. H. Clark, president of the American Electric Railway Engineering Association, who was present at the meeting, outlined the results of a visit to Washington, and said that the repeated impact testing machine was now running about 17 hours a day, and striking about 3,600 blows per hour. It drops a 400-lb. weight 6 in. on the joint. R. H. Dalgleish added that arrangements had been made to install a so-called "telemeter" on the lines of the Washington Railway & Electric Company to obtain data on the actual impact of car wheels. The committee asked the chairman to request the chairman of the committee on welded rail joints to resume the distribution of the monthly bulletin to members of the way committee.

C. H. Clark outlined his views on the organization of the special committee which he will appoint in the near future to make an exhaustive personal study of the subject of rail corrugation. The members of this committee will visit several of the larger railways in this country and report their conclusions.

One of the most important problems requiring solution in connection with the question of surface hardening of rails is the matter of accurately determining the amount of wear. Several members made suggestions and expressed their views on the subject, and a number also offered to furnish instruments which they had used for this purpose. The next step of the sub-committee will be to determine the relative wear on treated and untreated rails.

Review of existing standards, standardization of frogs and switches, crossing designs, welding methods, welding wire, and the allowable limit of wear were other subjects considered. Those present were: H. H. George, chairman; C. A. Alden, V. Angerer, H. H. Dartt, W. R. Dunham, Jr., E. B. Entwisle, T. A. Ferneding, R. B. Fisher, Chester F. Gailor, Fred Glenton, Jr., D. J. Graham, H. C. Heaton, Norman M. Hench, M. M. Johnston, Thomas J. Lavan, E. L. Lockman, H. F. Merker, L. A. Mitchell, O. C. Rehfuess, E. M. T. Ryder, A. T. Spencer, J. B. Tinnon, W. W. Wysor, R. H. Dalgleish, sponsor.

Special Reports Available

THE following special reports have been prepared by the Bureau of Information and Service of the American Electric Railway Association and are available to member companies in good standing upon request. Beginning with the new year the bulletins, reports, compilations, etc., will be numbered in the order in which they are issued. This, it is believed, will make ordering easier.

Bulletin No. 1—Electric Railways Operating Motor Bus Lines: Revision of the compilation of Aug. 1, 1924, bringing up to date data on the number of routes and buses operated, type of bus and seating capacity, fare charged and transfer privileges, etc. There are approximately 180 companies included in the present list.

Bulletin No. 2—Trend of Electric Railway Operations: A month-by-month record of the traffic, revenues, expenses, taxes, car-miles, operating ratio, etc., of a group of 80 companies since Jan. 1, 1920. This is a new edition of the compilation of Aug. 1, 1924, bringing the record of operations of this group of 80 companies down through October, 1924.

Bulletin No. 3—Motor Bus Operations in the United States, Part II: This is a second installment of a list of motor bus lines, the first part of which was issued Dec. 1, 1924. It shows the name and address of all motor bus operators and where the information is available, statistical data on the character of their operations. The present installment covers the states of Iowa, Washington and West Virginia.

Bulletin No. 4—Trend of Material Prices: New edition of the association's compilation bringing down to date the trend of prices of materials used by electric railways furnished by manufacturers.

In addition to the above, supplements to the Wage Bulletin, Fare Bulletin and Cost of Living Studies have been prepared, bringing them down to date.

Arrangements for Mid-Year Dinner

THE American Electric Railway Association is sending out descriptive material and a tentative program for the Mid-Year Meeting and Dinner which will be held in Washington, Feb. 15 and 16. Blanks are inclosed for reservations for the dinner and allotments will be made in the order in which requests are received.

Monday will be devoted to committee meetings, between 15 and 20 committees having made arrangements to meet that day.

The morning and afternoon sessions on Tuesday will be held in the Chamber of Commerce Building, H Street and Connecticut Avenue. They will be in the form of a town meeting or open forum with free discussion by all interests represented. The morning topic will be "What Are the Facts About Electric Railway Service." The discussion will be led from the standpoint of the outsider by Peter Witt of Cleveland, Ohio, and from the standpoint of the manufacturer by J. G. Barry of Schenectady, N. Y. The subject for the afternoon session will be "Motor-buses—When, Where and How They Should be Used by Electric Railways." S. B. Way of Milwaukee will lead the discussion from the electric railway standpoint, while a representative of the National Automobile Chamber of Commerce will present the viewpoint of the motor bus operator.

The dinner will be held at the New Willard Hotel. Addresses will be given by national speakers in the government service at Washington as well as by leading men of the electric railway industry.

Washington offers many attractions peculiar to itself. With this in mind the committee of arrangements is planning a special program that will be of interest to the ladies who are in attendance.

News of Other Associations

A.E.S.C. Elects Officers

AT THE annual meeting of the American Engineering Standards Committee on Dec. 11 Charles E. Skinner, assistant director of engineering Westinghouse Electric & Manufacturing Company, a representative of the American Institute of Electrical Engineers, was elected chairman for the year 1925, and Charles Rufus Harte, construction engineer the Connecticut Company, representative of the American Electric Railway Association, was elected vice-chairman.

Southern Equipment Men Will Meet

The Electric Railway Association of Equipment Men, Southern Properties, will hold its annual meeting in Dallas, Tex., Jan. 21, 22 and 23.

Maintenance of Equipment

Millwork Stored in Racks

SIDE posts, belt rails, arm rests and other car replacement parts made in the shop mill room are stored in racks located in a room adjacent to the mill room by the Columbus Railway, Power & Light Company. These racks are made up of waste, or otherwise worthless lumber.

The uprights are $3\frac{1}{2}$ in. x $1\frac{1}{2}$ in. and are approximately 8 ft. long. The cross-members are odd-sized



In Columbus, Ohio, Millwork Is Stored in Racks Where It Is Readily Available for Car Repairs

pieces approximately $\frac{1}{2}$ in. x $1\frac{1}{2}$ in., while the diagonal braces at the center of the framework are lighter strips. The racks are 30 in. deep and about 10 ft. long. The lower openings of the rack are of sufficient height to accommodate car side posts vertically. Above these spaces are two tiers of small openings approximately 1 ft. square which hold short lengths of interior trim. Long pieces of molding and beading are stored the long way of the racks.

On the front of the rack just above the openings are labels which identify the contents. As this material is not under the jurisdiction of the stores department, a carpenter may take any part needed from the rack without giving a requisition for it.

Similar racks are used for storing sash, doors, and other small

made-up millwork. With these storage facilities, it is possible to utilize the wood-working machines to the best advantage, as a large quantity of any one particular piece may be made up at a time. With an ample supply of millwork replacement parts a car may be put through the shops in less time than when making individual parts.

Cheap Dasher Card Racks

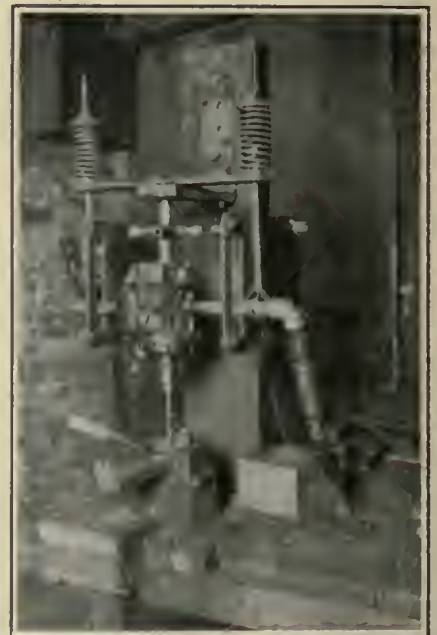
STEEL strips bolted fast to the dashers have been installed by the Altoona & Logan Valley Electric Railway, Altoona, Pa., to hold display cards. These strips are slightly raised from the face of the dasher and the card is slipped in at the bottom. After it has been pushed all the way up it is allowed to drop back a fraction of an inch into the lower support. Previous to the installation of these racks advertising and other cards were carried on wooden boards suspended from hangers on the dashers. The earlier practice was rather unsightly and the swinging of the boards when the car was in motion had a tendency to deface the paint. The new rack costs only \$2.25 to install. This is not appreciably more than the cost of the old boards.



This Neat Card Rack Costs But Little More to Install Than the Unsightly Wooden Dasher Sign Which It Has Replaced

Using a Portable Drill as a Drill Press

A SET-UP using a Chicago Pneumatic Tool Company's drill for work ordinarily done on a drill press has proved a great time saver at the 39th Street shops of the New York Rapid Transit Corporation, Brooklyn, N. Y. It has been used principally in



With This Supporting Arrangement a Pneumatic Drill Is Used for Drilling Small Parts on the Work Bench

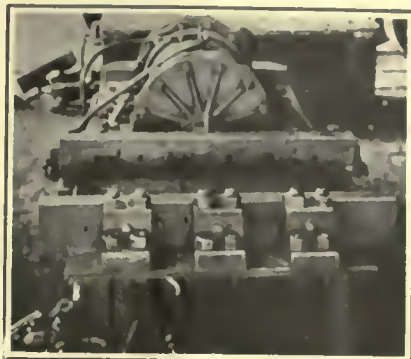
connection with some work which required finishing operations at the bench. In the ordinary procedure the workman would be required to walk a considerable distance to the nearest drill press for the drilling operation. By setting up this pneumatic tool on the bench the workman could do the entire job without unnecessary walking and waste of time.

The vertical support for the pneumatic drill consists of a 10-in. channel, as shown in the illustration. A bracket is bolted to this with a crossarm which has two supporting springs. Hooked rods passing through these springs with washers and caps at the top keep the drill firmly in contact with the supporting bracket. The flexible hose connection allows vertical movement of the drill so that it can be fed into the work by the hand screw in the ordinary manner.

Provision for the vertical motion is made by two slotted guides bolted to the channel on either side, and which hold in position the handles of the drill, to one of which the air supply passes.

Pinion Failure Traced to Worn Axle and Housings

THE ACCOMPANYING illustration shows a pinion which was one of several being tested in service by the Worcester Consolidated Street Railway. Inspection was made and measurements were taken of each pinion approximately every 20,000 miles. The pinion shown in the illustration was inspected at the end of 24,154, 41,288 and 56,682 miles and had very little wear up to the last inspection, when it was found to be ruined. Referring back to the time of the previous inspection showed that the interval was exactly 15,394 miles. An investigation was begun to determine the cause for this pinion breaking down in service, when it previously had shown up so well. The axle and axle bearing housing of the motor on which this pinion was installed were



A Simple Pneumatic Bulldozer Built in the Shops of the Kansas City Railways Has Proved to Be a Very Efficient Shop Tool

chine was built in the forge shop some years ago and has saved its cost many times over by reducing the time required for various small forming jobs.

The bulldozer is used for forming all small angle plates, wear plates, and similar truck parts, and also for truing up light castings. The illustration shows the stationary back bar which is bolted to the frame of the machine, and also the movable bar which is fastened to the piston, and to which are bolted the various dies and forming tools that have been developed for use with the machine.

The air cylinder has a bore of 16½ in. and a stroke of 24 in. It develops a pressure of 21,000 lb., when air at a pressure of 100 lb. per square inch is admitted. The piping is arranged with a double-action valve so as to develop pressure on the piston for movement in either direction.

Handy Tank for Heating and Cleaning Pinions

A SIMPLE type of hot water heater is found handy in the shops of the Twin City Rapid Transit Company, Minneapolis, Minn. This is used for preheating pinions before they are placed on the armature shafts. A circular steel tank, steam jacketed, has a capacity of 60 gal. of water. By the admission of low pressure steam to the jacket this is kept at a temperature close to the boiling point.

This tank is useful for another purpose. In many cases pinions are removed from armatures for various reasons before they are worn out. They are usually very greasy and disagreeable and hard to handle. To put them in condition for handling in the shop until they are put back in service soda ash is added to the

hot water in the tank and the greasy pinions are readily cleaned by immersion in the solution.

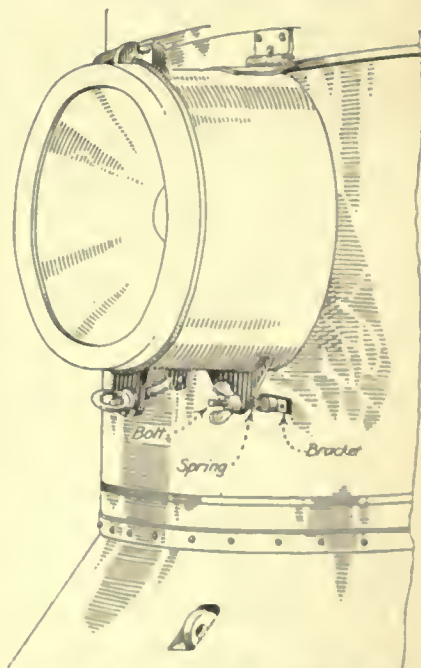
A sheet metal hood conducts steam and other vapors to a ventilating flue, thus preventing them from spreading into the shop.

Causes of Pull-Ins

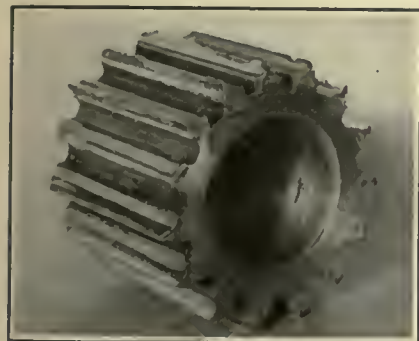
REPORTS compiled by the Electric Railway Association of Equipment Men, Southern Properties, for the first 11 months of the year just ended show that more pull-ins were caused by defective armatures than by any other one thing. On the nine railways furnishing figures for the entire period pull-ins from this cause numbered 597. Air brakes were responsible for 515, controllers 338, brake rigging 318 and defective field coils 300. While the total number of pull-ins for other reasons was large, no one cause was as important as those listed above.

Adjustable Headlight Mounting

HEADLIGHTS on the suburban and interurban cars of the Gary Street Railway, Gary, Ind., are mounted on the dash in such a manner that they may be tilted. This



Adjustable Mounting of Headlights on Suburban Cars of Gary Street Railway Allows Beam of Light to Be Directed Toward the Proper Point Ahead of Car



The Ends of the Pinion Teeth Were Destroyed as a Result of Worn Axle Bearing Housing

found worn considerably but the bearings themselves showed very little wear. This housing and axle wear had allowed the gear and pinion centers to separate so that sufficient pressure was exerted at the ends of the teeth to cause the pinion to wear excessively at this point and ultimately break.

Air Operated Bulldozer

By J. L. ROGERS

Forge Shop Foreman Kansas City Railways

A HANDY, home-made outfit that has proved very useful on many kinds of work in the forge shop of the Kansas City Railways is the pneumatic bulldozer shown in the accompanying illustration. This ma-

permits the motorman to direct the ray of light to the proper point ahead of the car. The headlight is fastened at the top to a hinge and is

held at the bottom by a bolt with winged nut. This lower fastening is adjustable. It is used to tilt the headlight up or down about the hinged support at the top.

An ordinary flat iron hinge, approximately 4 in. wide, is bolted to the vestibule belt rail and to the top of the RM-12 Golden Glow headlight. The flange for mounting the headlight in a recess in the dash is removed. A short piece of angle section is riveted to the bottom of the headlight casing. A hole in the projecting lip of this flange piece receives a $\frac{1}{2}$ -in. bolt which is held in a small bracket attached to the dash.

An automobile valve spring placed on the bolt between the headlight flange and a washer at the bracket keeps the headlight flange against a winged nut on the end of the bolt. The spring serves to hold the headlight in position after adjustment is made by the nut.

Before taking the car out, the motorman adjusts the position of the headlight so that the beam of light strikes the ground at the proper point ahead of the car. This adjustment is made so that the light is not thrown up into the air, temporarily blinding motorists or pedestrians alongside the right-of-way.

tachment does not materially alter the appearance, size or method of operation of the circuit breaker.

Collapsible Arm for Door Engines

AN IMPROVED type of collapsible arm for the engines which operate sliding type car doors has been brought out by the Consolidated Car Heating Company, Albany, N. Y. The arm is made in two parts. The one fastened to the operating shaft of the door engine is made of pressed steel and forms a housing for the other part of the arm to slide in. This housing contains two springs about 10 in. long, which keep the arm in its extended position. Should

New Equipment Available

Drive Screws for Permanent Fastening

FOR attaching nameplates or making permanent assembly, where screws once inserted are not removed frequently, the Parker-Kalon Corporation, New York, N. Y., has brought out a hardened metallic drive screw which cuts its own thread in the material as it is hammered in. Such a type of screw is cheaper to install because the cost of tapping is saved and less time is required to make the fastening. An accompanying illustration shows the construction.



Hardened Metallic Drive Screw

is controlled electrically by means of push buttons. The control of the welding head and travel of the motor are so interlocked that when the starting button is pushed, the arc is automatically established simultaneously with the starting of the travel motor. Should the arc fail for any reason, the travel motor will stop without overtravel. When the arc is re-established, the travel motor will restart without attention from the operator. The equipment is approximately 3 ft. 6 in. long, 2 ft. 7 in. wide, and 2 ft. 6 in. high, and has a weight of 800 lb.

Shockproof Circuit Breaker

DDOUBLE-POLE, interlocked-trip and shockproof circuit breakers are new types being placed on the market by the Roller-Smith Company, New York, N. Y. The interlocked-trip breaker is so arranged that the two poles are closed independently and successively. In case of an overload the pole first closed will open as soon as the second pole is closed. Should an overload occur after both poles are closed they will open simultaneously. This type of breaker is intended for use largely on motors and feeder circuits in place of switches and fuses.

Shockproof circuit breakers are intended for operation under conditions of excessive vibration or so subject to mechanical shock as to cause undesirable openings. Any listed standard type circuit breaker can be supplied with shockproof attachment to meet any requirements. It is said that the addition of this at-



Door Engine Fitted with Collapsible Arm
Above, arm in extended position. Below, arm forced back to provide door opening.

a passenger be caught by the door, it can be pushed back readily so as to provide for his release up to the time when the door is entirely closed. Another improvement in the construction of this arm is the use of a hardened steel roller with ball bearings, which runs in the pressed steel track on the door with no possibility of binding. This construction is the same as that used on the sheaves for door hangers furnished by the company and provides interchangeability.

Travel Carriage for Arc Welding

IN ORDER to simplify the work of building up worn flat surfaces by the arc-welding method, a travel carriage has been developed for automatic welding of straight seams by the General Electric Company, Schenectady, N. Y. This carriage is a self-contained unit and includes an automatic welding head, the necessary control, a travel motor and a wire reel. The welding head and control are mounted on the apron of the carriage, so as to feed the electrode wire from the reel to the arc.

In operation the travel carriage

The News of the Industry

\$50,000,000 Project

Reported Electrification Plan of Pennsylvania Railroad Comprises More than 220 Miles

The Pennsylvania Railroad will electrify its lines between New York and Washington in the near future, according to a report published in New York and Philadelphia newspapers. This involves one of the heaviest four-track trunk line systems in the world, about 220 miles in length. Estimates of the cost of the work are said to be upward of \$50,000,000. Short portions of the route from the Pennsylvania Station in New York City to Manhattan Transfer, New Jersey, and in the vicinity of Philadelphia already are operating electrically, the former on the third rail system at 600 volts direct current and the latter on an overhead trolley at 11,000 volts, single-phase. The plan of electrification will be to use the 11,000-volt system throughout. In connection with the New York, New Haven & Hartford Railroad, which operates with electric power on the 11,000-volt alternating current system between New York and New Haven, this would be a continuous electrified line of some 300 miles.

No power plants are included in the construction program, it is said. Power is to be purchased from several of the utility companies along the line, such as the Public Service Electric & Gas Company, the Philadelphia Electric Company and its subsidiary, the Susquehanna Power Company, and the Consolidated Gas, Electric Light & Power Company of Baltimore.

No confirmation could be obtained of the reports up to the time this paper went to press. Undoubtedly, a program so extensive as this would have to be carried out in a piecemeal fashion, inasmuch as it would take several years to complete the entire project. It is possible that the first section to be converted would be that from Philadelphia to Wilmington, which has been mentioned several times as the next electrification to be undertaken by the Pennsylvania Railroad.

Flat 6-Cent Fare in Duluth

Under an order issued by Federal Judge Wilbur F. Booth, sitting at St. Paul, Minn., the Duluth Street Railway, Duluth, Minn., is entitled to charge a straight 6-cent fare. Judge Booth's order affirms the findings of Judge T. D. O'Brien, special master, to the effect that any fare under 6 cents would not provide a fair rate of return on the valuation of the company's property. On July 13, 1922, the State Railroad & Warehouse Commission filed an order granting the Duluth Street Railway the right to charge a flat rate of

6 cents for single fares and to sell coupons at the rate of five rides for a quarter. From this order the company appealed to the federal court, and as a result of a hearing before a special master the flat 6-cent rate was ordered.

Pending appeal the company issued coupons bearing five tickets which sold for 30 cents. The stub of the tickets constituted a coupon redeemable by the

company for 5 cents if the Railroad & Warehouse Commission rate of five rides for a quarter were sustained. The coupon, however, will be void unless upon appeal to the United States Supreme Court the city secures a reversal of the order for a flat 6-cent rate.

The City Council is now considering the matter of an appeal, but no action has yet been taken.

Interstate Commission Controls Rates of Interstate Interurbans

Supreme Court Distinguishes Between Urban and Interurban Railways and Places the Rates of the Latter Under Federal Regulations

—Justice McReynolds Dissents

A DECISION of the federal court for the Northern District of Ohio has been reversed by the United States Supreme Court. In an opinion rendered on Jan. 5 the Supreme Court declared that the Interstate Commerce Commission has authority to regulate passenger rates on an interstate electric interurban railway regardless of whether it is part of a general steam railway system. Laying down this principle, the court did not feel it necessary to pass upon the point of whether the electric carriers involved were engaged in a general freight business, which was another question raised in the original suits. The court quoted various passages of the Interstate Commission acts of 1887 and 1910 to show that all common carriers by railroad were included in their provisions, pointed out that the federal employers' liability act and the safety appliance act had been applied to interurban electric railways and that in the transportation act of 1920 certain classes of electric railways were excluded only by express mention. The court also referred to the Omaha & Council Bluffs Street Railway case (230 U. S., 324, 327) and said that the distinction in that case, in which the commission did not have rate jurisdiction over an interstate line because it was purely an urban system, had been carefully observed in the present case. Justice Brandeis rendered the decision of the court. Justice McReynolds dissented.

The two cases under consideration were parallel in principle and were decided in the single opinion rendered. Both cases were appeals by the United States for the Interstate Commerce Commission and the electric railways involved from adverse decisions in the local district court. One case involved the village of Hubbard, Ohio, and the Pennsylvania-Ohio Power & Light Company and the other involved the city of Wellsville, Ohio, and the Steubenville, East Liverpool & Beaver Valley Traction Company.

In both cases the Interstate Commerce Commission had assumed jurisdiction and ordered the electric railways to increase intrastate passenger fares within Ohio so as to remove discriminations against interstate passenger fares between Ohio and Pennsylvania points. The fares within the Ohio municipalities were not disturbed, but the increased intrastate rates came in conflict with ordinances of Hubbard and Wellsville and suits were brought by these communities to test the authority of the I.C.C.

The District Court held with the Ohio communities that as the electric railways involved were neither parts of general steam railways nor generally engaged in carrying freight, they were excluded from the jurisdiction of the Interstate Commerce Commission. From these decisions, the government, with the railways, appealed.

In his dissenting opinion, Justice McReynolds asserts that nowhere has he found an expression by Congress to disregard the limitations of the commission's authority over electric lines laid down by the court in 1913 and that "the states can and should control until and unless Congress, by clear language, shall indicate the intent to regulate."

Wisconsin Commission Rules It Cannot Authorize Abandonment

Ruling that it could not authorize the abandonment of a railway franchise unless the consent of the City Council had first been given, the Wisconsin Railroad Commission dismissed the petition of the Janesville Traction Company to discontinue service on its Washington Street line. In its findings the commission said that it was apparent that the applicant could not indefinitely furnish service at a financial loss, that the city must grant substantial concessions in this form of relief from paying obligations or that there must be a considerable increase in patronage.

Further Interurban and Bus Co-ordination in Missouri

Decisive action in co-ordinating interurban bus and electric railway transportation has been taken by the Kansas City, Clay County & St. Joseph Railway. The Missouri Public Service Commission recently granted the company the right to reduce its train schedules, and on Dec. 31 the company installed two more Blue Bus service routes. Train schedules on the electric railway will be altered.

On the Excelsior Springs division rush hour trains will run as before. Mid-day trains will run one and one half hours apart, instead of one hour. Running time between Kansas City and the Springs will be reduced 6 minutes on all trains. A new train will leave Kansas City at 10:30 at night to meet the demand of picture show crowds, which develop earlier than those from the theaters.

On the St. Joseph division the only trains that will be taken off are locals that ran on the same time as the limiteds. The limiteds will stop on flag at the three towns en route, Ferrelview, Camden Point and Dearborn. All local trains on the St. Joseph division will be speeded up.

Operating its "Blue Car" de luxe safety coaches, already on hourly schedule between Kansas City and Excelsior Springs, the Kansas City, Clay County & St. Joseph Auto Transit Company at this time protects itself as far north as Trimble, Mo., where the fare is \$1. Nearing Kansas City fares from the other towns served are: Smithville, 75 cents; Nashua, 55 cents; Gashland, 40 cents; Linden, 30 cents; Templeton, 25 cents; North Kansas City, 20 cents. Three round trips are made as far as Smithville, and two from there to Trimble. It is the intent of the railway to extend the bus line to St. Joseph as soon as the paved road is completed.

Robert P. Woods, president of the companies controlling both bus and electric line, says: "We believe in the interurban business."

"Blue Line" de luxe safety coaches are to be used on all routes.

What the Railway Does

Advertising matter pointing out the place in the community enjoyed by the electric railway industry is being issued by the Chicago Surface Lines. The advertising is addressed to heads of industries and mentions the Chicago lines only incidentally, aside from the signature of Henry A. Blair, president of the Surface Lines. Under the heading "Street Car and Factory," Mr. Blair says:

As an individual you have a civic interest in good street car service.

As a manufacturer you have a financial interest in the proper solution of the problems of street car operation.

Efficient local transportation is essential to orderly industry and street cars provide the only satisfactory and dependable mass transportation.

Street railways contribute directly toward industrial prosperity, for a surprisingly wide variety of materials are used in their construction, equipment and operation. These materials are always bought near home.

And the payroll of the street car system is no insignificant item in the community budget. The Chicago Surface Lines, for instance, pays out in wages a total of

\$30,000,000 a year, all of it disbursed in the district served by the system.

It is to the interest of every citizen to see that street railways are given a fair chance to render efficient service.

More than this they do not ask.

Detroit Commission Balks

Refuses to Approve Contract to Standard Company for Buses—Change in Authority Contemplated

After voting at its last 1924 meeting to award a contract for furnishing the Detroit Department of Street Railways with 50 double-deck buses, the City Council has been blocked in its action by the Street Railway Commission. On its part, the department has refused to sign the contract for the purchase of the buses from the Standard Motor Truck Company, Detroit. In consequence it appears likely that a charter amendment will be submitted to the voters in the spring providing for a return to the original status under which the City Council will have no control over contracts awarded by the Street Railway Commission.

Notwithstanding the recommendation of the department that the contract for 50 buses be awarded to the Yellow Coach Manufacturing Company, Chicago, which has both built and operated buses, the City Council voted to award the contract to the local company which has never built any buses. Information from Ross Schram, manager of the railway, that the commission would not sign the contract led the Council to consider giving the voters a chance to decide the issue, in the way of a charter amendment. Such a charter amendment if passed will put the Department of Street Railways entirely under the control of the Mayor and the Street Railway Commission or in the same status that it was originally when the municipal system was started by former Mayor James Couzens. The commission believes it was a mistake to add a clause giving the Council the right to approve contracts for the street railway.

About four months ago the first bids were asked for furnishing buses to supply transportation in the unserved outskirts of the city. About three years previously the D. S. R. had been authorized to buy trackless trolleys or buses. An amendment to the charter approved about the same time removed the duty of buying equipment for the D. S. R. from the Department of Purchases and Supplies, but the contracts according to the amendment, are subject to the approval of the City Council.

After certain trials, it was decided by the commission that the trackless trolleys were not fully satisfactory for use in the intended service. Later Mr. Couzens, then Mayor, authorized the purchase of one single-deck bus. After further study William B. Mayo, chief engineer of the Ford Motor Company and at that time general manager of the D. S. R., recommended double-deck buses and specifications were drawn up by the commission's engineers, which left the way open for various companies to bid.

When the first bids were opened on Sept. 9, 1924, proposals were submitted by two motor truck companies in Detroit and by two bus manufacturers

with factories located in other cities. It was decided to reject all bids. When new bids were opened on Sept. 29, they were lower than the original ones. In opposition to the recommendation of the Street Railway Commission, the Council on Nov. 15, meeting in committee, voted to award the contract for 50 buses to the Standard Motor Truck Company, Detroit, the lowest bidder. The matter was reopened when Ross Schram, general manager, questioned the decision that the Standard Company was low bidder on the grounds that it bid on a type of bus differing in several respects from the specifications.

While awaiting final decision as to the purchase of the double-deck buses, the renting of 25 single-deck buses was authorized and these buses are being put into operation as rapidly as they are delivered by Dodge Brothers Motor Car Company. The city pays a rental of 29 cents per bus mile of operation and reserves the right to purchase the buses, the rental paid to apply on the purchase price. An account of this new service is given in another column.

When Mayor John W. Smith on Dec. 1 suggested the purchase of five buses from the two local bus companies and from the Yellow Coach Manufacturing Company, the Council directed the Street Railway Commission to take the matter up with the three companies. An order for five buses was refused by the Standard Company. The vote in the Council awarding the entire 50 buses to the Standard Company followed. Later this move was blocked by the commission's refusal to sign the contract.

The Council has approved the request of the general manager of the D. S. R. to rent 25 additional Dodge single-deck buses and early deliveries were urged because of the great demand for bus transportation. One line has already been put into operation, the first trip being made over the Mack line on New Year's day, with eight buses in operation. The number is to be increased as the vehicles are delivered to the commission.

Providence Still Negotiating New Labor Agreement

Negotiations for a new working agreement or for arbitration are still in progress in Providence, R. I., between the officials of the United Electric Railways and the union employees. Although the men have recently taken a vote in favor of suspending work, their act did not necessarily mean that they would strike. This phase of the matter was stressed by Delegate Coleman, who stated that negotiations with the company were still under way, but that union officials did not propose to allow the conference to drag on.

The contract with the men expired Oct. 31. Prior to that date the men submitted demands calling for an increase of 14 cents. The present scale is 56, 59 and 61 cents. In addition to the disagreement over the wage scale the labor and company representatives were unable to come to a settlement over the question of arbitration. The attitude of the men and the company has been referred to previously in the ELECTRIC RAILWAY JOURNAL.

Purchase Before Council

Chicago Body Hopes to Present Traction Measure to Voters on Feb. 24

The Chicago municipal traction ordinance providing for a referendum on the co-ordination deal there in connection with local railway operation has been placed in the hands of the City Council by Mayor Dever with a request to rush passage so the proposition can go on the ballot on Feb. 24. The ordinance provides what is known as a half billion dollar plan for immediate subway construction, purchase and extension of the Chicago Surface Lines and an offer to the Chicago Rapid Transit Company for the elevated properties.

ORDINANCE ADVANCED PROMPTLY

The ordinance was submitted on the morning of Jan. 5 and in the afternoon had gone to the local transportation committee of the Council, which had Major R. F. Kelker, Jr., and finance and legal experts before it for questioning. Aldermen who oppose the extensive building of subways brought up the unprofitable operation of subways in New York to Major Kelker as an argument against certain parts of the proposed Chicago system and Major Kelker answered them with figures from the Dec. 20 issue of the *ELECTRIC RAILWAY JOURNAL*. He quoted the figures on part of a mile to show that the approximate cost per mile in New York was \$25,000,000 as against \$10,000,000 a mile in downtown Chicago and \$3,000,000 in outlying districts. His argument carried the point of relative profit.

The ordinance is based on satisfactory consummation of arrangements for buying the Surface Lines at \$162,700,000 or less, based on an appraisal being made by Major Kelker, William J. Hagenah and Gen. William Barclay Parsons, the latter having sent H. M. Brinckerhoff from his New York office to represent him.

The elevated lines situation is dealt with frankly in the ordinance, the administration recognizing that Samuel Insull has solid backing for his statement that the mortgages on the lines interfere with a sale. However, the maps of the proposed unification and primary stage of extensions as explained by Major Kelker show the existing elevated lines completely bottled up by proposed city lines, which, while not in direct competition, will limit elevated zones of influence to small fringes paralleling the lines.

All the city-built tube and elevated structures are laid out so that connections can be made with the elevated lines should a later purchase be made, or the city lines can cover much the same territory by surface line feeders using universal transfers.

Every effort was made to utilize all the existing facilities. In one case an arrangement was made to purchase 3 miles of Rock Island Railroad suburban line to give rapid transit to a district 16 miles from the business section in the loop.

An official summary of the ordinance drawn by Corporation Counsel Bush

and Alderman Swartz, authors of the measure, has been issued to explain the terms of the purchase. This statement ran to the extent of several newspaper columns.

Settlement of Issues at Toledo Expected Shortly

Many electric railway developments are expected in Toledo in 1925. The Community Traction Company favors a cross-town bus line and co-ordination of bus and railway operation so as to afford extensions to some new sections of the city.

Then the application of the Toledo People's Motor Bus Company to put in a competing bus system is before the Public Utilities Commission at Columbus. It is not believed any action will be taken on this application before the settlement of a similar issue in regard to Cleveland. The chances are that any decision of the commission will be appealed to the Supreme Court and that it will be many months before a definite decision on the competitive bus operation is had. The Ottawa Coach Line, which is the largest independent and competing line in Toledo, has already announced a fare increase effective on Jan. 9, at which time the cash fare will be 10 cents and a token rate of six for 40 cents will be started. Heretofore, the fare has been 7 cents cash.

Settlement of the power cases started many months ago are also expected in the next few weeks. The question of jurisdiction of the Public Utilities Commission on power rates between the Toledo Edison Company and the Community Traction Company has been argued, but as yet no decision has been rendered. The courts have already refused jurisdiction under the Milner ordinance. In the meantime the Toledo Edison Company has voluntarily reduced the power rate for the traction lines.

Los Angeles Banishes the Horse

DOBBIN is peremptorily banished from a district several square miles in Los Angeles, Cal., under the McClintock traffic ordinance, effective Jan. 22, but six months' grace is allowed for gradual enforcement of the new rules. During the six months horse-drawn vehicles are excluded from this area in rush hours.

The new ordinance provides for traffic lanes and rules for pedestrians, the same as motorists. There will be "No walking" and "No standing" signs. Fine and imprisonment will be the punishment for disregarding them. The signs for pedestrians will be painted on the sidewalks.

Jaywalking is forbidden, and those who cross the streets afoot are to be compelled to signal their intention with upraised arm, just as autoists signal for turns. Some long street blocks will have pedestrian-crossing zones painted in the middle.

Detroit Extends Bus Service

Motor Coaches Used as Feeders for Existing Trolley Lines with a Charge for Transfer

Bus service with single-deck coaches was started on Jan. 1 by the Department of Street Railways, Detroit, as a short extension to its Mack Avenue line, and on Jan. 4 a similar service was begun as an extension of the service on the East Warren Avenue line. The buses used were secured from the Dodge Brothers Motor Company on a rental basis with the understanding that the department may purchase them if it so desires at the expiration of 3 years.

In addition to these routes, the department also has two routes operating from the northern end on its Woodward Avenue line and a short route on the west side of the city, connecting with its trolley line on Grand River Avenue.

The fare charged on these buses is 10 cents cash or a street railway ticket and 4 cents additional. Street railway tickets are sold nine for 50 cents, the railway cash fare being 6 cents. This bus fare entitles a passenger to a free transfer to the street railway cars. If a second transfer is desired, it can be secured for 1 cent additional.

A passenger on a street railway who wishes to transfer to a bus can secure a transfer by the payment of 4 cents additional fare. The transfers used are of the usual kind, arranged to be punched for time, but read in large letters: "To Motor Coach" or "To Street Car," as the case may be.

The buses used have a capacity for 21 seated passengers. The seats are upholstered in real leather. Pneumatic tires are used. The bus floor is of double thickness to keep out cold and dust, and the center aisle is slightly depressed, so that the mat which occupies this space comes flush with the floor line. This type of mat prevents the passenger from slipping when he enters or leaves the coach.

Urban Bus Lines in Virginia Improperly Protected

There is insufficient credit base in Virginia to warrant a feeder bus system being organized as an auxiliary to electric railway service in cities. So the Virginia Railway & Power Company, operating railways in Richmond and Norfolk, holds in a recent issue of "Public Service News," published by it. In explaining why it cannot at this time agree to supplement its urban lines with buses the company said:

Our company stands ready to supplement its service with buses and even blimps, if necessary, and it has done everything possible to get a proper credit base for such investment in the state of Virginia so that it might be in a position to invite and attract the capital needed from time to time to furnish an adequate transportation service, but this has not yet been accomplished.

In Virginia the bus has been declared a common carrier only on state highways, not in the cities: in the cities it is still a free lance and subject to most any kind of competition the different localities might devise. The basis for investment in bus transportation offered investors in other states does not prevail in Virginia cities and any investment which has been made so far is purely speculative.

Binghamton Company Seeks Seven-Cent Fare

The Binghamton Railway, Binghamton, N. Y., at a recent meeting of Common Council presented a petition asking permission to increase its fare within the city limits to 7 cents. The company is unable to continue operating under the existing 6-cent rate, it is declared. Unless the 7-cent rate is permitted, the petition sets forth, the company will be compelled to curtail operations greatly or appoint a receiver to conduct its affairs. The great increase in the use of automobiles is declared one of the moving causes for the failure to meet expenses under the present fare schedule. The communication was referred to the finance committee of the Council.

The petition alludes to the receivership of William G. Phelps, which was terminated Jan. 1, 1924, and appended a statement which showed the company had operated at a loss during the last year.

A comparison of the net corporate income during 1924 and 1923 showed a deficit of \$20,214 for the year 1924, and this, added to the previous deficit of \$41,997 for 1923, made a total deficit of \$62,211.

The petition set forth that no dividends had been paid on the capital stock of the company since 1913. The company had been forced to curtail its service greatly already, especially on its outlying lines, the report said.

Municipal Ownership Talk Revived in Winnipeg

A special committee may be appointed by the new City Council of Winnipeg, Man., at the first meeting of that body this month for the purpose of considering the advisability of taking over the railway from the Winnipeg Electric Company. The matter is now under discussion in municipal circles, and it is felt that early action to deal with the question is desirable. The city will have to give its decision on the franchise question in June of 1926, which will probably mean that the electors will be consulted in a referendum at the next civic elections.

The preliminary procedure suggested is that the committee thus appointed should devote itself to ascertaining all the facts relating to the railway and the probable obligations which would have to be assumed provided it were acquired under the terms of the agreement. It is also proposed that a survey of railway situations be made in other cities, particularly Toronto and Detroit.

Railway Restrained from Operating Buses

Rumored plans of the Stark Electric Railroad, Alliance, Ohio, to purchase three buses for use between Canton and Alliance were blocked on Jan. 3, when the Stark County Common Pleas Court issued an injunction against the railway restraining it from operating buses either in Canton or Alliance or on the highways between the two cities.

The case was started by Mrs. Sadie

Salisbury, Canton, proprietor of a bus line which has been operating for six years. This company at present operates buses over the Canton-Alliance highway.

Charges that the Stark Electric was conspiring with Samuel Derenberger to compete with her have been made by Mrs. Salisbury.

The restraining order expires on Jan. 12, when a hearing will be held on a permanent injunction. Mrs. Salisbury says the railway has no authority from the Ohio Public Utilities Commission to operate buses.

A short time ago the Stark Electric started half-hour service over the entire line from Salem to Canton, a distance of about 40 miles. This is effective from about 5 o'clock in the morning until 7 o'clock at night.

Uniform Bus Regulation Urged in Oregon

Operators of buses in Oregon—and electric railways are included among them—are agitating for regulation of authority over their industry. It is cited that buses operating in and out of Portland are under the jurisdiction of the police department as represented by the motorcycle squad, the traffic officers and the patrolmen. In addition, there is a superintendent of motor buses, with uniformed officers and special deputies, who makes rules and interprets them. Moreover, there is no real basis of taxation. A bus company in Portland must pay a gasoline tax, a special license tax and \$4 to the state. The city imposes a bus tax, as does the federal government, and the manufacturers also pay a federal tax of 5 per cent of the price of the bus. Operators must also furnish a public liability and property damage bond and an insurance policy to the Public Service Commission of Oregon. The bus owners are willing to comply with any centralized authority, but insist that something be done to eliminate this scattering of supervision.

Suburban Riders Will Pay Same Fare as Cleveland Riders

The City Council of Lakewood, a suburb of Cleveland, has agreed to have its car riders pay the prevailing rate of fare charged Cleveland car riders, and as a result, John J. Stanley, president, has withdrawn from service one-man cars he had been using on one of the main lines operating through Lakewood. Lakewood has a franchise calling for a 5-cent fare, but the rate in Cleveland now is 6 cents, with a 1-cent charge for transfer. The Lakewood City Council agreed to permit the Cleveland rate of fare on its lines if Mr. Stanley would withdraw the one-man cars.

The Cleveland rate of fare is to go into effect 40 days from Jan. 5, although it is unlikely that a referendum will be called on the Council's action, as many Lakewood citizens had expressed their willingness to pay the Cleveland rate of fare, despite the company's franchise, if Mr. Stanley took the one-man cars off the Clifton line.

Committee Will Decide Service for Reading

The Selectmen of Reading, Mass., have voted to cancel a contract under which the Eastern Massachusetts Street Railway has operated a bus service between North Reading Center and North Reading Junction at a cost of \$2,200 a year to the town to cover the deficit. The contract expired on Oct. 31. The town agreed to pay \$2,200 for another year, but the Eastern Massachusetts had been operating at a loss very much larger than the \$2,200 and proposed a schedule of fewer trips per day. As the railway declined to maintain the old schedule and the Selectmen declined to accept the new one, though they had agreed upon the \$2,200 deficit, the Selectmen recently decided to cancel the contract. The company has agreed, however, to maintain the service for a reasonable length of time. A committee has been appointed to provide service over the route which the Eastern Massachusetts will abandon. A schedule of the service will probably be offered for public bids within two or three weeks.

Bus Ordinance in Lansing Upheld

Judge Leland W. Carr, in Ingham County Circuit Court, has denied a temporary restraining order against enforcement of the Lansing ordinance regulating routes of buses operating out of the city. An injunction was sought by the Michigan Highway Transportation Association on the ground that the ordinance conflicted with a legislative act of 1923 placing control of buses with the Michigan Public Utilities Commission. The association is expected to appeal.

Higher Fares Authorized in Madison

The Madison Railways, Madison, Wis., on Jan. 5 put into effect the following new rates: Cash fare for adults, 8 cents; cash fare for children under 12 years, 4 cents; tickets or tokens for adults, 17 for \$1; tickets or tokens for high school students, 10 for 50 cents, and two children under 12 on one adult ticket or token.

The new schedules, put into effect by an order issued by the Wisconsin Railroad Commission, are authorized in order to permit the company to make the extensions and replacements as outlined in the program agreed upon by the representatives of the company, the city and the commission. Details of the program were referred to in the Oct. 25, 1924, issue of the *ELECTRIC RAILWAY JOURNAL*. The order also makes it possible for the company to increase the wages of its men to the extent of \$10,000 for this year. Based on the number of riders during the past year, the company expects to raise \$80,000 additional revenue under the new schedule, which will enable it to carry out the improvement program. It is estimated that the entire program will cost \$700,000 and be spread out over a period of 7 years.

The commission will have supervision over the excess revenues to be derived

from the additional fares and also over the moneys to be obtained through the sale of new securities. This means that the excess over and above the operating expenses must be used for replacements and extensions.

With an adequate increase in revenue, the company will this year carry out the following improvements as part of its program of improvements: Rebuilding, double tracking and paving of Atwood Avenue from Division Street to Fair Oaks Avenue; double tracking and paving Breeze Terrace from University Avenue to Regent Street and purchasing 17 cars, replacing nine.

Renewed Agreement in Cincinnati Expires June, 1926

The agreement between the Cincinnati Street Railway and the Cincinnati Traction Company, Cincinnati, Ohio, that grew out of the negotiations for a new franchise has been renewed. The agreement expired by limitation on Jan. 1, but a new one became effective immediately thereafter. The new date of expiration is June 30, 1926. By that time the new city manager form of government will have been functioning in Cincinnati six months. This was contemplated in connection with the new agreement. Those who are interested in a new franchise considered that if Mayor Carrel succeeds in defeating the negotiation of a new franchise in the year that remains of his term, the new régime will have an opportunity to bring about a new contract. The renewal of contractual relations between the two companies that would be perfected if a new contract were approved would eliminate the Cincinnati Traction Company as the operating company. Its interests would be bought out by the Cincinnati Street Railway. It is understood that the modifications in the contract between the two companies were very slight.

Competition in Tacoma Reduces Railway Service

The Tacoma Railway & Power Company, Tacoma, Wash., is curtailing its service in an attempt to offset the loss of business to jitneys, fostered by Mayor A. V. Fawcett. The curtailment is being extended to lines paralleled by buses. In general, the cuts have been confined to service in outlying residential districts, in an effort to keep up service in the sections of heavier travel.

The unrestricted licensing of jitneys by the City Council, at the request of Mayor Fawcett, is a part of the Mayor's pre-campaign promises to give the city of Tacoma a 5-cent railway fare or drive the railway from its streets. The railway states that 5,000 persons are being carried daily by the jitneys. This means a loss of between \$250 and \$300 a day for the company.

After a two weeks investigation by its public affairs committee, the Kiwanis Club of Tacoma urged in a public resolution that efforts be made to co-operate with the traction company in furnishing better service to all parts of the city.

The City Commissioners of Tacoma have declared themselves entirely out of sympathy with the Mayor's plan. They have expressed the opinion that the jitney holds no promise of an adequate, reliable form of transportation for the city. At present 20 jitneys, ranging in capacity from 7 to 35 passengers, are skimming the cream from the railway by serving only the shorter and easier routes.

Portland Extensions Discussed

At a recent traffic hearing before the City Council, Franklin T. Griffith, president of the Portland Electric Power Company, Portland, Ore., stated that car lines would be built to any and all sections of the city if the people were willing to pay for the service. Mayor Baker declared that the railway must provide adequate service to all parts of the city, and that if the company would not do this he would favor granting a franchise to some company that would. Mr. Griffith announced that his company would meet the city on any reasonable plan for extensions of lines. Matters relating to providing adequate service to the outlying districts were referred to John M. Mann, Commissioner of Public Utilities, who was directed to hold hearings, make a thorough study and report to the Council.

Milton R. Klepper, attorney for the Portland Motor Coach Company, is asking for a franchise over five routes in the downtown district. He said that his concern was prepared to lay \$500,000 on the table before the Council whenever that body wanted to see it. Mayor Baker replied that this sum would be but a "drop in the bucket" in the cost of furnishing adequate transportation service for the city; that many millions of dollars have been invested by the Portland Electric Power Company, and that he would not be a party to any plan of competition, if that company would give the service needed.

Mr. Griffith stated that his company had in mind a crosstown bus line, a line over the new Ross bridge and the St. Johns bus line. He pointed out that the residential development of the city had been mostly at the ends of car lines, and the problem before the company was whether the extensions could be made to pay.

He pointed out that the Pacific Coast cities are large in area but are thinly populated. This presents a difficult problem for the traction companies to settle. He stated that 25 of the 32 railway lines in the city were not paying. He declared that if the bus lines served the city as the car lines do, they could not do it profitably at any such fare as proposed in the franchise of the Portland Motor Coach Company.

Mr. Griffith said that a zone system of fares would make it possible for each line to meet its own expenses, but he added that American people were opposed to such methods. Mayor Baker feels that a satisfactory plan for providing better service can be worked out with the company. He is proceeding in his consideration of the matter on that basis.

News Notes

Increased Rate Until June.—The Public Service Commission has issued an order granting to Leverett S. Miller, receiver of the Westchester Street Railroad, permission to charge until June 1, 1925, the increased rate of fare granted last June for transportation of passengers upon the Tarrytown, Silver Lake Park, Scarsdale and Mamaroneck Avenue lines.

Seeks Higher Rates.—A flat passenger rate of 3 cents a mile for the Joplin & Pittsburg Railway was asked in a petition filed in the federal court in Kansas City by Murdock H. MacLean of Chicago, receiver for the company. The present rates are 3 cents a mile in Missouri, 3.6 cents in Kansas and an interstate ticket is 3.6 cents. The petition also asked that fare be changed in incorporated towns along the line of the railway, a 5-cent fare for children and 10 cents for adults. In the petition Mr. MacLean asked a ninety-day trial of the new rates and then a permanent order if they proved desirable.

Higher Rates Approved.—Fares on the Rochester & Syracuse Railroad and connecting with Port Byron and Auburn will be increased 0.6 of a cent per mile over the former 3 cents a mile straight rate, effective on Jan. 18. The increase has received the approval of the New York Public Service Commission.

Fare Controversy Over.—The California Railroad Commission, upon request of the complainant, has dismissed the complaint of the city of Alameda against the Southern Pacific Company and the Key System Transit Company, involving one-way and commutation fares between Alameda and San Francisco.

Will Reconsider Fare Clause in Franchise.—Rather than have the International Railway abandon its Sugar Street line, Niagara Falls, with the possible application for abandonment of other local lines where the company is reported to be losing money through the 5-cent fare, the Niagara Falls City Council is reported to be willing to change the company's franchise so as to allow it to appeal to the Public Service Commission for a reasonable rate of fare. The commission recently decided that it was without authority to increase fares from 5 to 7 cents owing to certain provisions in the franchise. The commission, however, agreed to allow the company to abandon its Sugar Street line. The International will continue to operate the Sugar Street line until an agreement can be reached with the City Council.

Railway Man Receives Honor.—J. P. W. Brown, general superintendent of the Nashville Railway & Light Company, Nashville, Tenn., has been declared the most valuable citizen of Nashville in 1924. This is the opinion of Kiwanis, which calls together a representative from each civic club to name the person whose service to Nashville has been of the highest character.

Pamphlet for Utility Investors.—A treat for the new year in the form of a pamphlet is "The Security Survey," which will appear quarterly, so that those who own securities of the Illinois Power & Light Corporation may know about the developments and facts of interest regarding their investment and the company back of it. The January number requested helpful suggestions and constructive criticisms.

Arrested Operators Discharged.—Seven operators of one-man cars in the city of Buffalo charged with violating the new anti-one-man car ordinance enacted by the City Council over the objection of the city law department were discharged when arraigned for trial in City Court. Despite the ruling of the court, Mayor Frank X. Schwab has ordered the police department to arrest other operators of one-man cars on local lines of the International Railway who were found to be driving cars faster than the ordinance allows. Traffic police have arrested additional motormen and their trials have been adjourned until Jan. 23. Counsel for the railway contended in court that the ordinance is illegal and that the authority for regulating one-man cars rests entirely with the Public Service Commission, which already has held a hearing in Buffalo on the application of the city to force the abandonment of the one-man cars.

Ordinance Restricts "Jitney Buses."—The Board of Aldermen of the city of Louisville recently passed an ordinance which will have to go before the City Council regulating fares, routes, carrying capacity and overcrowding of "jitney buses" and forcing drivers of such cars to put up a \$500 real estate bond for each one operated. It is also understood in Louisville that there is a movement under way for a bill before the next Legislature to force all owners of automobiles to carry insurance and to arrange for liability coverage in the event of accident.

Asks Co-operation of Automobile Owners.—The Oklahoma Railway, which has failed to obtain relief from adverse traffic conditions in Oklahoma City, Okla., has undertaken to work out its own salvation by inducing automobile owners to refrain from using the downtown streets for car storage during business hours. Placards have appeared in all local cars reading: "Automobiles for pleasure; street cars for business." The recent cold weather and bad condition of the streets have caused hundreds of automobile owners to avail themselves of electric transportation, and the company has sought to secure their continued patronage and co-operation by urging the advantages of the street car for everyday business travel.

Extra Fare Charged.—A new tariff charging an extra fare of 1 cent for all passengers riding in cars across the Juniata bridge at Lewistown, Pa., was filed with the Public Service Commission recently by the Lewistown & Reedsville Electric Railway. The tariff will become effective Feb. 1. The extra fare is being levied for the purpose of making up the sum of \$4,000 charged against the company for repairs on the bridge by the Mifflin

County courts. The company has appealed and pending action on the appeal will give rebate slips for the 1-cent fare. Tickets will be sold at 12 for 11 cents or 50 for 45 cents.

Students Ask Special Rate.—A resolution petitioning the Philadelphia Rapid Transit Company, Philadelphia, Pa., to grant a reduced fare to students en route to school was passed recently by a special committee of 100 high school students. The resolution pointed out that many cities and many railroads grant special rates to students.

Money Appropriated for Bus Chassis.—The City Council of Seattle, Wash., has passed an ordinance appropriating \$38,000 to purchase truck chassis for five buses, three of which are to be operated on Empire Way, and the others held for emergency use. The superstructure of the five buses will be built in the shops of the Seattle Municipal Railway, thereby reducing the cost. The plan of operation on the Empire Way bus line will be the same as on other bus lines operated by the municipal railway, the fare will be 10 cents cash, or 8½ cents token, with free transfers to and from the municipal railway. Request of the Seattle-Rainier Valley Railway to the Council for a bus franchise was opposed by residents of the Empire Way district.

Fares Increased.—With the virtual consent of patrons, fearful of suspension of service under present conditions, the Board of Public Utility Commissioners of New Jersey has approved requests of the Five-Mile Beach Electric Railway in Cape May County, N. J. and of the Atlantic & Suburban Railway, in Atlantic County, to increase rates from 6 to 10 cents. Weekly passes will be issued at \$1 each for use between Sept. 15 and June 15 of the ensuing year. The new rate of the Atlantic & Suburban Company, operating between Atlantic City and Pleasantville, will be 16 cents instead of 14 cents. On the three remaining zones the fare will be increased from 7 to 8 cents. Strips now selling at ten for 65 cents will be increased to 70 cents. Similar increases are granted with request to various forms of commutation tickets.

\$5 Gift for Employees.—Every employee of the East St. Louis & Suburban Railway, East St. Louis, Ill., received a Christmas present of \$5 together with a personal letter from W. H. Sawyer, president, replete with the Yuletide sentiment. The letter also thanked the workers for the splendid co-operation accorded the management in the past and requesting a continuation of this spirit.

Wants to Extend Bus Service.—The St. Louis Bus Company, a subsidiary of the United Railways, has asked the Board of Public Service of St. Louis, Mo., for permits to operate two more bus lines as feeders to existing railway lines.

Bus Line Given Up.—The bus line operated between Beverly and Essex, Mass., since early in the summer was abandoned on Dec. 1, according to an announcement by officials of the Eastern Massachusetts Street Railway. The revenue did not pay the expense.

Commission Against Higher Fare.—For the second time within the last 6 months the Public Service Commission has handed down a decision adverse to the International Railway, Buffalo, in its attempt to secure a higher rate of fare on local lines in the cities of Tonawanda and North Tonawanda. The company asked a fare of 14 cents between certain points in the two cities. The commission held that the franchises limit the rate of fare and the commission is without authority to increase the charges without the consent of the municipal authorities.

Interurban Puta on Buses.—The Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, has instituted bus service connecting Waterloo, Independence and Jesup. Buses stop on signal at any point along the route to receive or discharge passengers.

Limited Service Authorized.—Rapid service over the East St. Louis-Belle-ville, Ill., division of the East St. Louis & Suburban Railway was made possible on Dec. 15 by the City Council of East St. Louis permitting the railway to run limited trains on the division. The cars formerly stopped in East St. Louis only at certain street. The fast cars would utilize the Day line or old Belleville Electric tracks to Mount Hope Cemetery, where they would connect with the main line of the Belleville-East St. Louis division.

Would Operate Buses Between Buffalo and Niagara Falls.—Application has been made by the International Bus Corporation, Buffalo, a subsidiary of the International Railway, to the municipal authorities of Tonawanda and North Tonawanda and to the town board of Tonawanda for permission to operate a de luxe bus line between Buffalo and Niagara Falls, via Kenmore and the Tonawandas, and also over streets and highways in the towns and cities between Buffalo and Lockport.

Policies for Christmas Gifts.—Christmas presents in the shape of \$500 life insurance policies were presented to 5,901 public utility employees of the North American Light & Power Company and subsidiary companies. The blanket amount of the company's gift policies is nearly \$3,000,000. Subsidiary companies of the North American Light & Power Company are the Illinois Power & Light Corporation, Illinois Traction System, Missouri Power & Light Company, Kansas Power & Light Company and Iowa Power & Light Company. The employees' policies were taken out in the Travelers' Insurance Company, Hartford, Conn.

Skip-Stop Arrangement Planned.—The Jacksonville Traction Company, Jacksonville, Fla., will put the skip-stop service into effect during rush hours in South Jacksonville. This will be undertaken to relieve the congestion.

"Azuride" Wins Prize.—An eleven-year-old school boy won the prize of \$5 in car tickets offered by the Tri-City Railway, Davenport, Iowa, for suggesting the name since adopted for the publication which will be distributed soon in the cars. The winning name was "Azuride." The little paper will be printed twice a month and placed in the cars. It will contain information of interest to passengers.

Financial and Corporate

Story of Receivership

Indiana Interurban Unable to Pay Bonds and Meet Interest—Road Hard Hit by Private Auto

The receivership for the Union Traction Company of Indiana was precipitated by the inability of the company to pay bonds, interest and other fixed charges amounting to more than \$300,000. This inability was occasioned by a large decrease in the earnings of the company during 1924, resulting in a reduction of more than \$500,000 in the gross revenue for the year. It was impossible to meet this decrease in receipts by corresponding reductions in operating expenses, and the company, therefore, found itself at the close of the year without the large sum of money necessary to pay its bond interest and without the credit required for a loan of that magnitude.

CREDITOR BROUGHT ACTION

As explained in the ELECTRIC RAILWAY JOURNAL for Jan. 3 the receiver was appointed on the application of the Westinghouse Electric & Manufacturing Company, which asserted that the defendant is indebted to the plaintiff for \$74,192, a sum long past due. It further was alleged that the railway has other debts it is unable to pay and is in imminent danger of insolvency. The complaint also alleged the company was unable to pay \$281,125 in semi-annual interest and \$29,150 in rentals that were due the first of the year.

Arthur W. Brady, receiver and president of the company, says that the buses and the privately owned automobiles, with their lack of state regulation in contrast to the regulation imposed on the electric and steam lines, have been the principal factors that have contributed to the present condition of the company. Largely on this account the company has filed a petition with the Indiana Public Service Commission for permission to abandon its interurban service between Anderson and Middletown and to substitute the operation of a bus line for the present traction service. The diminished earnings on this branch are attributed by the petition largely to the bus line between Anderson and Newcastle by way of Middletown, "which motor bus line is not subject to any regulations or restrictions in respect to the service it shall give or the rate it shall charge."

FUNDS NEEDED FOR IMPROVEMENTS

The petition states that funds are needed to improve the property and service on other lines and that it is unfair to discriminate against patrons of the other lines who contribute the earnings from which deficits must be paid on the line sought to be abandoned. The Union Traction Company is the pioneer interurban system in Indiana. The first interurban in the state was built and operated between Anderson and Marion more than 30 years ago

with Charles L. Henry, Indianapolis, and Philip Matter, Marion, as the promoters. This road subsequently was acquired by the Union Traction Company with Mr. Henry president and general manager. When he sold his interest, George F. McCulloch, now dead, became the president and general manager. He was succeeded by Mr. Brady, formerly Mayor of Muncie, Ind., who has been president for many years. Harry A. Nichol is general manager.

The system of the Union Traction Company consists of 455 miles of road. In addition to the extensive interurban lines it includes city systems in Anderson, Muncie, Marion and Hartford.

Electric Railways in California Issue \$13,067,496 in Securities

During the 12 months ended Dec. 31, 1924, the California Railroad Commission authorized public utilities to issue \$237,875,848 of stock and bonds, and other evidences of indebtedness, the largest amount ever authorized by the commission in any one year since March 23, 1912, the effective date of the public utilities act. In addition to granting applications to issue \$237,875,848 of securities during 1924, the commission denied applications to issue \$100,000 of securities and dismissed without prejudice applications to issue \$1,178,358, making a total of \$239,154,206 acted upon during the year.

The amounts authorized during 1923 and 1924 are divided into various classes of securities as follows:

Class	1923	1924
Stock	\$74,809,880	\$128,391,109
Bonds	115,290,210	102,027,900
Notes	340,845	4,201,838
Equipment trust certificates ...	6,362,000	3,255,000
Total	\$196,802,935	\$237,875,847

Of these totals electric railways issued \$13,067,496 in securities in 1924 and \$29,059,093 in 1923.

Gross Earnings Up in Philadelphia

The Philadelphia Rapid Transit Company, Philadelphia, Pa., rounds out its fiscal year with about \$45,460,000 gross revenue, comparing with \$44,930,491 for 1923. The company has had the benefit of the new rates of fare for only a little more than three months, but the gain in passenger revenue during that time is said to be about in conformity with the company's estimated requirements.

For 1924 a small surplus over all charges will be shown, the rate relief having made it possible to earn substantially the 10 per cent wage dividend for employees, amounting to between \$1,850,000 and \$1,900,000, in addition to the 6 per cent dividend for stockholders, amounting to \$1,800,000. In 1923 the wage dividend was not earned by \$50,000.

Receivers Appointed for Oklahoma Railway

Judge F. E. Kennamer in the Oklahoma federal court, Western district, on Dec. 27 granted the plea of bondholders for the appointment of a receiver for the Oklahoma Railway, Oklahoma City, Okla. George A. Henshaw, a former member of the Oklahoma Corporation Commission and a well known Oklahoma City attorney, and John W. Shartel, president and general manager of the company, were appointed co-receivers. They are to give bonds of \$20,000 and are to file an inventory within sixty days of the company's finances, including its assets and liabilities. The court will not pass on the application of the bondholders to abandon some of its unprofitable lines in Oklahoma City until this report is made to the federal court. Mr. Henshaw among other duties will handle the public relations of the company.

The receivership was granted on a showing by the bondholders to the court that the Oklahoma Railway last year lost about \$100,000 on operation of its Oklahoma City lines, due largely to automobile and jitney competition.

Before it went into receivership the company had filed an application with the State Corporation Commission asking for permission to increase its rates to 10 cents single fare, three fares for 25 cents. This plea is set for hearing Jan. 10.

Mr. Henshaw has announced that a complete survey of the company's property, both local and interurban, will be made by G. H. Clifford, Fort Worth, general manager of the Northern Texas Traction Company, which in 1924 won the \$1,000 prize and certificate awarded by the Coffin Foundation each year to the electric railway in the United States making the most notable contribution to the advancement of the industry.

\$821,459 Spent in Chicago on Subway Surveys—None Built

For thirteen years Chicago has been studying the feasibility of subways, and in that period of time the sum of \$821,459 has been spent in "surveys" and "reports," with not a spadeful of earth turned as yet. City Controller Martin J. O'Brien recently disinterred these facts.

With close to \$1,000,000 in reports filed, the City Council about six months ago authorized another inquiry to disclose "how, when and where, if subways are found practicable, they may be built."

The money for the various reports has come from the city's share of the traction receipts, paid under the terms of the 1907 traction ordinance, whereby the city gets 55 per cent of the net receipts of the Chicago Surface Lines.

This traction fund now totals \$40,376,776, having grown from the first deposit of \$1,556,809, to which has been added interest of \$8,480,353.

Bion J. Arnold made the first survey of the city's traction needs in 1911. He recommended subway construction. His report cost the fund \$24,642. In 1912 Mayor Carter Harrison created a sub-

way and terminal commission which undertook a new study of the Chicago traction problem. After three years of study, a "comprehensive" subway plan was recommended, at a cost of \$120,071. Then in 1916 another \$203,882 was spent for the so-called Ridgeway-Arnold-Parsons report. Ridgeway and Parsons collaborated with Walter Fisher in a supplemental report in 1917, for which the trio were paid \$76,820, and in 1918 Mr. Fisher received \$13,621 for other data on the same subject.

A junket of the local transportation committee of the City Council to California to study traction in the Western cities cost \$22,331. Lawyers received \$1,143 from the fund for their advice to the committee in 1919. In 1920 and 1921 Mayor William Hale Thompson dipped into the fund to finance his scheme for a 5-cent fare. A 35-page booklet was issued at a cost of \$195,093.

During the Thompson administration, three attorneys, William H. Sexton, Stephen H. Foster and Jerome Frank, retained by the transportation committee, were paid \$57,790 for their legal advice in 1922. These same lawyers, who advised Mayor Dever during his recent unsuccessful negotiations with the Surface Lines, together with Major Kelker, received \$76,063 from the fund in 1923, and until Aug. 1, 1923, the same men have thus far been paid \$30,896 from the fund. There has apparently been no effort since then to bring the figures down to date.

Electric Line on Long Island Suspend

The Nassau County Railway, Sea Cliff, Long Island, has stopped running its cars. The company quit because it found it could not make any profits. It had operated a trolley line for 22 years between Sea Cliff, L. I., and Glen Cove. The road is more than 10 miles long.

Insull Interests Acquire Chicago & Joliet Electric Railway

Van Horn Ely, president of the American Electric Power Company, Philadelphia, Pa., has announced the company has sold several properties to the Central Illinois Public Service Corporation, acting for the Middle West Utilities Company of Chicago, Martin J. Insull, president. They include the Chicago & Joliet Electric Railway, operating in Joliet, Ill., with suburban lines leading into Chicago; the Quincy Gas & Electric Company, Quincy, Ill.; Warsaw Gas Company of Warsaw, Ind.; Goshen Gas Company, Goshen, Ind.; Niles Gas Light Company, Niles, Mich. The last three companies are in the vicinity of South Bend, Ind.

Funds for this purchase have been obtained by the sale of \$4,800,000 of serial gold notes, a public offering of which will be made shortly by Halsey, Stuart & Company. The notes will be in \$1,000 denomination, dated Jan. 2, 1925, and serial maturities of the issue in the amount of \$400,000 will be taken up each quarter beginning April 1, 1925, and ending Jan. 1, 1928. The first four maturities will bear 4½ per cent interest while the remaining eight will bear 5 per cent. The Central Illinois Public Service Company will sell

preferred stock among its customers over the three-year period for the purpose of permanently funding the purchase and meeting the note maturities.

Taxation Amount Cut.—At a final hearing of the Board of Equalization on Dec. 31 the assessment for taxation of the Louisville Railway, Louisville, Ky., for 1925 was cut \$434,633. The amount previously set was \$12,934,633.

Does Not Seek Abandonment Permission.—Upon request of the applicant, the California Railroad Commission has dismissed the application of the Los Angeles Railway for authority to discontinue the operation of portions of certain of its electric railway lines.

Line Abandoned.—The Danville & Sunbury Transit Company ceased operations on Dec. 31. The line operated between Danville, Pa., and Riverside, on the south side of the Susquehanna River, and ran to the Danville State Hospital. No disposition has been made of the equipment.

Purchases of P. R. T. Stock for Employees Increase.—New purchases of Philadelphia Rapid Transit Company stock for account of the wage dividend fund amounted to 40,000 shares during 1924. This makes the employees' total holdings of the stock 160,000, including 10,000 shares in the Welfare Association, or more than 26.6 per cent ownership of the entire 600,000 share capitalization.

Profit in Seattle.—The Seattle Municipal Railway lines, Seattle, Wash., showed a net profit of \$27,760 over all charges for October, according to the report submitted to the City Council by Superintendent of Railways D. W. Henderson. Gross revenues for the month were \$515,377, with operating expenses \$334,436. In addition, \$62,930 was set aside as the month's share of the annual interest charges and \$70,250 for bond redemptions. The usual allowance of \$20,000 was also made.

Extra Dividends Declared.—The Tri-City Railway & Light Company, Davenport, Iowa, has declared four quarterly dividends of 2½ per cent each, payable April 1, July 1 and Oct. 1, it was announced, to stockholders of record on the twentieth day of each preceding month. This is an increase of one-fourth of 1 per cent on the common.

Merger Bill Reappears in Washington.—A bill has been introduced in the Senate by Senator Ball of Delaware, chairman of the Commission on the District of Columbia, which proposes a merger of all the street railways, bus companies and the Potomac Electric Light Company. If these companies do not merge voluntarily, Senator Ball's bill proposes that the Public Utilities Commission take charge and operate them as a unified system after July 1, 1925. A measure similar to this has made its appearance at every session for the last 10 years at least.

Denver Decree Signed.—Federal Judge Symes has signed a formal decree giving the Denver Tramway, Denver, Col., permission to raise fares to any figures that will bring a net return annually of \$2,207,500, or 7½ per cent on the valuation of \$23,516,769 plus a reserve for depreciation of

\$450,000. The decree affirms the company's right to a perpetual franchise, obviating the necessity of an election in 1926.

Urges Purchasing of Substations.—J. D. Ross, superintendent of the light department at Seattle, Wash., has urged the City Council to take immediate steps to purchase the substations used by the Puget Sound Power & Light Company in supplying power to the Seattle Municipal Railway. He declares that each day of delay costs the city \$2,000, paid to the Puget Sound Company for power, and points out that a year's advance notice is required for taking over a substation.

Authorized to Issue Stock.—The Key System Transit Company, Oakland, Cal., has been authorized by the California Railroad Commission to issue prior preferred and preferred stock to refund \$56,000 of bonds of the San Francisco, Oakland & San José Railway, provided that the owners of the bonds in each instance pay to or otherwise account for, to the Key System Transit Company, the amount to which they, as owners of such bonds, are entitled to receive from the proceeds of the foreclosure sale of the properties securing the payment of the bonds, and provided further that the holders of such shares of stock shall have no right to any dividends payable prior to Jan. 1, 1925.

Abandonment Under Consideration.—A. N. Broadhead, president of the Chautauqua Traction Company, Jamestown, N. Y., announces that the company is seriously considering abandoning the entire system between Jamestown and Westfield, a distance of 32 miles, because the line is a losing proposition. An application is now pending before the Public Service Commission by the company to abandon that part of its line between Mayville and Westfield.

Equipment Sold.—The property of the Titusville Traction Company, Titusville, Pa., was sold on Jan. 3 to S. W. Platt & Company, a wrecking concern of Pittsburgh, and Lessor Levy, who will junk the property. The price was \$22,250. The sale was made to satisfy the first mortgage of \$106,000, on which \$24,000 in interest had accrued. The mortgage foreclosure proceedings were preceded by discontinuance of railway service on Dec. 31. Titusville is a town of 8,432 inhabitants. The railway operated 16 miles of line there.

Interborough Shows Deficit.—The total revenue of the Interborough Rapid Transit Company, New York, N. Y., for the 5 months ended November, 1924, was \$23,311,852, an increase of \$392,545 over a similar period for the year previous. The operating expenses, taxes and rentals paid the city for the old subway were \$15,562,302. This represented a decrease of \$534,802 over a similar period in 1923. The income available for all purposes was \$7,223,987. This is an increase of \$1,677,055 over a similar period in 1923. After the consideration of charges and rentals, the balance after actual maintenance showed a deficit for the 5 months' period ended Nov. 30, 1924, of \$459,711. This figure was an increase of \$1,297,514 over the balance shown in the five months ended Nov. 30, 1923.

Personal Items

Recognition for Long Career

J. K. Buchanan Becomes Executive Head of West Virginia Properties
—Paul H. Sommer Advanced

J. K. Buchanan, general manager of the local utilities in Morgantown, W. V., has been made a director, vice-president and general manager of both the West Virginia Utilities Company and the Wheeling Public Service Company. Mr. Buchanan succeeds M. R. Stern, Wheeling, who has resigned to take up private engineering work. Mr. Stern will, however, be retained as consultant to assist Mr. Buchanan, for a while at least, in handling the Wheeling properties.

With the elevation of Mr. Buchanan to the executive position in the two companies comes the announcement that Paul H. Sommer, for the past two years superintendent of the electric department in Morgantown, will become general superintendent of the properties there. He will take over the routine administration formerly handled by Mr. Buchanan.

Mr. Buchanan has been identified with the local utilities since 1904, when he entered the employ of the Union Utility Company, then a Morgantown corporation directed by Harry Warfield as executive officer. Mr. Buchanan rose steadily in the confidence of the owners until he reached the position of general superintendent, which he has held for the last 15 years. The Union Utilities Company then became the Union Utilities Company and later the West Virginia Traction & Electric Company, at which time its ownership passed into the hands of Eastern interests. During the war-time period there was a receivership, but this was lifted on April 1, 1920, and the property, along with that at Wheeling, was purchased in 1921 by Anderson & Company, Providence, R. I.

The Morgantown properties of the West Virginia Utilities Company include electric, water and street railway departments and are conservatively valued at \$4,000,000. The Wheeling properties, estimated at \$3,000,000, include a 25-mile street car line running from Wheeling to West Alexander, through the well-known "Pike" section of Wheeling and the suburban towns; a bus line within the city of Wheeling and an electric service to domestic customers along the territory served by the traction line.

F. H. Raub has succeeded E. S. Stoffet as supervisor of the Atlantic City & Shore Railroad, Atlantic City, N. J.

W. E. Johnson has succeeded C. N. Garrison as assistant secretary and assistant treasurer of the Springfield Traction Company, Springfield, Mo.

C. G. Staples is secretary and treasurer of the Springfield Electric Railway

Company of New Hampshire, with office at Brattleboro, Vt.

Walter P. Ordway is president of the Somerset Traction Company, Skowhegan, Me. He succeeds F. W. Briggs.

President Herr of Westinghouse Company in New York

E. M. Herr, president of the Westinghouse Electric & Manufacturing Company, has removed his headquarters from East Pittsburgh to New York. Mr. Herr is leaving Pittsburgh after having been there since 1899. He has achieved a notable place in industry. Graduating from the Sheffield Scientific School of Yale in 1884, he became a special apprentice of the Chicago, Milwaukee & St. Paul Railway in the motive power department and later was engaged as mechanical draftsman and test engineer and superintendent of telegraphs and later as a division superintendent of the Burlington Railroad. In 1890 he was appointed master mechanic on the Chicago, Milwaukee & St. Paul and in 1892 was appointed to the superintendency of the Grant Locomotive Works in Chicago. In 1895 he was in Russia establishing locomotive works there. Then he was made general superintendent of the Gibbs Electric Company, Milwaukee, and later superintendent of motive power of the Chicago & Northwestern Railroad. Thence he went to a similar position on the Northern Pacific. In 1899 he entered the service of the Westinghouse company and after various promotions was elected to the presidency in 1911.

Thomas I. Carter is one of the vice-presidents of the Cumberland & Westport Electric Railway, Frostburg, Md.

Winchell G. Yates, who for the last four years has been superintendent of track and railway of the Wheeling Traction system, Wheeling, W. Va., tendered his resignation to G. S. Wills, general superintendent, to take place immediately. He is leaving the traction company to go into the contracting business for himself. Mr. Yates has been connected with the Wheeling Traction Company for more than 13 years.

V. D. Jennings is treasurer of the Central Maine Power Company, Rockland, Me. The position was formerly held by Walter S. Wyman, since made president.

A. William Sperry, New Haven, Conn., has been engaged as managing engineer of the Danbury & Bethel Street Railway, Danbury, Conn., now in receiver's hands.

C. H. Forsgard is general superintendent of the Durham Public Service Company, Durham, N. C.

A. I. Hunter, formerly treasurer of the Grand Forks Street Railway, Grand Forks, N. D., is now head of the claims department. E. J. Lauder has assumed the position of treasurer.

New Vice-President

Official of Canadian Westinghouse Company Made Vice-President and General Manager at Pittsburgh

F. A. Merrick, vice-president and general manager of the Canadian Westinghouse Company, Hamilton, Ont., has been elected vice-president and general manager of the Westinghouse Electric & Manufacturing Company in general executive charge of the activities of the company.

Mr. Merrick is a native of New Jersey. He received his technical education at Lehigh University. Shortly after graduation he was employed by the Steel Motors Company, a subsidiary of the Lorain Steel Company, where he was responsible for many important electrical inventions and rose to the position of chief engineer. Later he joined the Westinghouse company at East Pittsburgh, Pa., in charge of the production of street railway motors. After the formation of the Canadian Westinghouse Company, Ltd., in 1903, he was sent there as superintendent, and later became manager of works and finally vice-president and general manager.

During the war Mr. Merrick had charge of the factory of the New England Westinghouse Company, at Chicopee Falls, Mass., from which the government's requirements in Browning machine guns were supplied. Mr. Merrick had to reorganize and largely reequip this factory in order to handle this work, but he was able to complete 60,000 guns within 11 months after operations were begun. This manufacturing achievement is regarded as probably without parallel.

After the war Mr. Merrick was located in London for 2 years as special representative of the Westinghouse Electric International Company. He then returned to Canada.

S. R. Perkins has succeeded B. Crow as master mechanic of the Tulsa Street Railway, Tulsa, Okla.

A. W. Walton has succeeded W. K. Danvers as electrical engineer of the Oklahoma Railway, Oklahoma City, Okla. O. P. Johnson is now roadmaster, replacing T. McMains.

Dwight B. Dean, formerly vice-president and general manager of the Kuhlman Car Company, Cleveland, Ohio, has become associated with the Yellow Coach Manufacturing Company, Chicago. Mr. Dean will represent the Yellow Coach Company, with headquarters in the Hanna Building, Cleveland.

George L. Markland is second vice-president of the Stone Harbor Railroad, Stone Harbor, N. J. Joseph P. Lodge, formerly secretary, has been succeeded by James B. Lichtenberger, who is performing the duties of secretary and treasurer.

E. E. Thornton, for many years in charge of train service of the Key System Transit Company, operating in Oakland and San Francisco, Cal., has been succeeded by Harry T. Brobeck, former superintendent of the central division. Mr. Thornton has been with the Key System Transit Company for

about 25 years and is now on sick leave. Charles E. Bourn has been transferred from superintendent of the western to the central division, while W. B. Hamilton takes charge of the western division, left vacant by Mr. Bourn. W. A. Niedrich has been promoted to acting night superintendent to replace W. B. Hamilton.

Obituary

Capt. H. M. Stine

Capt. Henry M. Stine, secretary and treasurer of the Pennsylvania Street Railway Association since 1909, with offices in Harrisburg, Pa., died at his home in that city recently. Captain Stine's public activities had a large scope. He was president of the County Commissioners' Association of Pennsylvania in 1923 and at the time of his death was chairman of the legislative committee of that body. He was serving his third term as County Commissioner. He served one term as Recorder of Deeds and three years ago he was a candidate for the Republican nomination for Congress from the Harrisburg district.

His military career covered two wars. In the Spanish-American War he was second lieutenant in Company I, Fourth Pennsylvania Volunteer Infantry. He saw service in Porto Rico. After the war he was active in the National Guard, and at the entrance of the United States in the World War he was placed in command of Company C in the Eighth Regiment, which became the 112th Infantry in the reorganization of the army on a war basis. He mustered his company in Chambersburg in 1917. The 28th Division, of which the 112th Infantry was a part, trained at Camp Hancock, Augusta, Ga. There Captain Stine was taken ill and he was sent back home while his company went overseas without him. During the Mexican border campaign in 1915 and 1916 Captain Stine recruited in Harrisburg and throughout the Cumberland Valley for the Pennsylvania National Guard.

Captain Stine was a graduate of Dickinson College, Carlisle, and of the Dentistry School of the University of Pennsylvania. He was 63 years old.

Charles Smith, the Pittsburgh representative of William Wharton, Jr. & Company, Inc., Easton, Pa., died in Pittsburgh on Dec. 16.

Fred Pefferkorn, superintendent of the Municipal Street Railway, Alexandria, La., died recently.

Frank Edward Haylock, for many years active in the coach painting departments of electric and steam railroads and for the past 16 years foreman of the paint department at the shops of the Schenectady Railway, Schenectady, N. Y., died on Jan. 2, at the age of 60, after an illness of six weeks. Mr. Haylock prior to his connection with the Schenectady Railway held responsible positions in the paint departments of the New York Central & Hudson River Railroad and the Rutland Railroad.

S. D. Hutchins

Well-Known Figure in Central Electric Railway Territory Had Long Been Ill

S. D. Hutchins, representative of the Westinghouse Air Brake Company at Columbus, Ohio, with which he had been connected since May, 1896, died in that city on Jan. 5. "Judge" Hutchins, as he was familiarly known, was one of the most beloved of traction men in the Central West. He was genuinely accepted in the counsels of the electric railway men, as much so, as though he were himself an operating man. It had become the custom to intrust to him for years past the work of making all business arrangements for the meeting places and accommodations of the Central Electric Railway Association. He will be remembered by many for his



S. D. Hutchins

handling of the boat trips on the Great Lakes, if for no other of his labors. Nothing was left undone by him on these occasions.

Judge Hutchins was an unusual figure in many respects. Not only was he loved and esteemed by his immediate associates and the officials of all the electric railways with whom he came in contact, but he commanded the respect and the admiration of the rank and file of the electric railway employees. In fact, it was his work in behalf of the trainmen that led to his appellation of "Judge." No matter how busy he was, Judge Hutchins always found time to act in arbitration cases and was drafted for service in many of them. In these his rôle was always that of umpire. Men and companies alike had absolute confidence that he would decide on the facts and the facts only. Bias had no part in his make-up. He knew the trials and tribulations of the men—for he had been one of them—and he knew the trials and tribulations of the managements, for he was close to them. Moreover, he had the faculty of expressing himself tersely and still not giving offense. In all of this work his services were rendered gratis.

Judge Hutchins was born in Cleveland, Ohio, on May 25, 1855. He was an old-time locomotive engineer. He ran on the Big Four Railroad between Co-

lumbus and Cincinnati from 1876 to 1895 and left that company as the senior engineer with first choice of runs and engines. For seven years he ran the best fast passenger train between Columbus and Cincinnati. Because of the skill he displayed in braking this train smoothly, he won the attention of H. H. Westinghouse, who sent for him to come to Wilmerding at the former's expense for an interview. Inasmuch as the Judge had secured patents on an angle cock and a new air gage, he thought that the purpose of the interview was to make some deal in this connection. As it turned out, however, Mr. Westinghouse offered him a job as chief instructor of the Westinghouse Air Brake Company, with the duties of showing locomotive engineers all over the country how to operate the brakes. It seems that the brake apparatus was being accused of all the shortcomings, whereas it was largely a matter of lack of skill on the part of the men. After two or three months of consideration of leaving the railway with which he had been so long connected, Judge Hutchins finally went over to his new work on an extended leave of absence. The railroad really never did let him quit.

In his new work he traveled all over the country for about two years, and then put in three years with headquarters in Buffalo. Judge Hutchins refused to move his family from Columbus, Ohio, and the company told him that if he would not move his family to Buffalo the company would move his office to Columbus. And it did so. It sent him there to act as special engineer in connection with air-brake equipment installations and troubles. Finally he picked for himself the job of straightening out air-brake equipment in use on the electric railways, most of which consisted of a simple tank of air piped to the brake cylinder with a plain valve for control. If anything happened to the air piping on either side of the valves, the air exhausted to the atmosphere and the car was without brakes.

The first work was to eliminate the weaknesses of this system. There followed the introduction of "automatic air." The first equipment of this type was put on an interurban car at Ypsilanti, Mich., the Judge personally spending two weeks "on his back" to make the installation. But the triple valve used was not flexible enough and he was recalled in a week and had to change back to straight air. But from this start experiments were made and the control gradually perfected. By his single-handed work and persistence, and almost complete control of design for the electric lines, there was developed a uniform system of braking, about the only thing that is a complete standard on the electric railways.

For a long time Judge Hutchins had not been well. Unsparing of himself, he did too much. So a year ago the Westinghouse company sent Mr. and Mrs. Hutchins abroad for a 10 weeks' trip. His health improved for a time after his return, but the improvement was only temporary. He had made inroads on his energy too deep to be repaired. The dear old Judge has passed on to his great reward.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Copper Production Breaks Records

Production of copper in 1924 broke all previous records except those for the years during the World War. The output from domestic sources during the last year, as determined by the Geological Survey from reports of the smelters showing actual production for 11 months and the estimated production in December, was 1,628,000,000 lb., compared with 1,435,000,000 lb. in 1923, an increase of more than 13 per cent over that year, which itself was the highest of record with the exception of the war years. The smelter production of copper in December, as estimated by the producing companies, was 137,000,000 lb., a little higher than the average monthly production for the year, or at the rate of about 1,644,000,000 lb. a year.

The production of new refined copper from domestic sources, determined similarly, was about 1,764,000,000 lb., compared with 1,464,000,000 lb. in 1923. In 1924 the production of new refined copper from domestic and foreign sources amounted to about 2,293,000,000 lb., compared with 1,980,000,000 lb. in 1923. In addition to the output of new refined copper about 136,000,000 lb. of secondary copper was produced at the refineries, compared with 131,000,000 lb. in 1923, so that the total output of refined copper was about 2,429,000,000 lb. in 1924 and 2,111,000,000 lb. in 1923.

The imports of unmanufactured copper during the first eleven months of 1924, according to the Bureau of Foreign and Domestic Commerce, amounted to 706,127,251 lb., compared with 676,473,388 lb. during the entire year 1923 and 541,013,220 lb. in 1922. The imports of copper in the first eleven months of 1924 were thus higher than during any previous calendar year. The exports of copper also increased substantially during the first eleven months of 1924 and were higher than those recorded for any other calendar year except 1917. The exports in December will probably not be quite large enough to make the figures for 1924 surpass those for 1917. The exports for the first eleven months of 1924 were 1,018,426,271 lb., compared with 829,314,002 lb. during the entire year 1923.

Double-Truck Articulated Locomotives for Montreal

The Harbor Commissioners of Montreal recently received the four electric locomotives ordered in January, 1924. A brief description of these locomotives was given in *ELECTRIC RAILWAY JOURNAL* for Dec. 13. Further details are now available. Each locomotive weighs 100 short tons, all the weight being carried on the driving wheels. They are of the box cab, double-truck, articulated type, equipped with four 430-hp. motors. Power is transmitted to the axle through twin spur gears. The trucks and superstructure were built

by Messrs Beyer Peacock & Company, Manchester, England. Motors and electric control equipment were manufactured by the English Electric Company at its Preston works, where the locomotives were finally assembled and equipped. Following the usual Canadian practice they are fitted with M.C.B. automatic couplers, airbrake equipment, brake blocks, etc., made according to American standard design.

Some of the principal features are given in the following table:

Total weight.....	100 (short) tons
Weight per driving axle.....	25 (short) tons
Diameter of driving wheels.....	50 in.
Total wheel base.....	28 ft. 0 in.
Fixed wheel base.....	9 ft. 3 in.
Length over buffers.....	40 ft. 0 in.
Length over cab.....	33 ft. 9 in.
Brakes.....	Westinghouse, 14 E.L.
Pantographs.....	Two, air-operated
Number of motors.....	Four
Type of motor.....	D.K. 96, 430-hp.
Line voltage.....	2,400 d.c.
Motor voltage.....	1,200-volt d.c.
Motor ventilation.....	Forced
Tractive effort on tread of wheels and speeds (forced ventilation):	
Continuous rating.....	32,000 lb. at 16 m.p.h.
One-hour rating.....	43,000 lb. at 15 m.p.h.
Normal acceleration.....	50,000 lb. up to 14 m.p.h.
Maximum acceleration.....	60,000 lb.

Street Car Production Expected to Increase

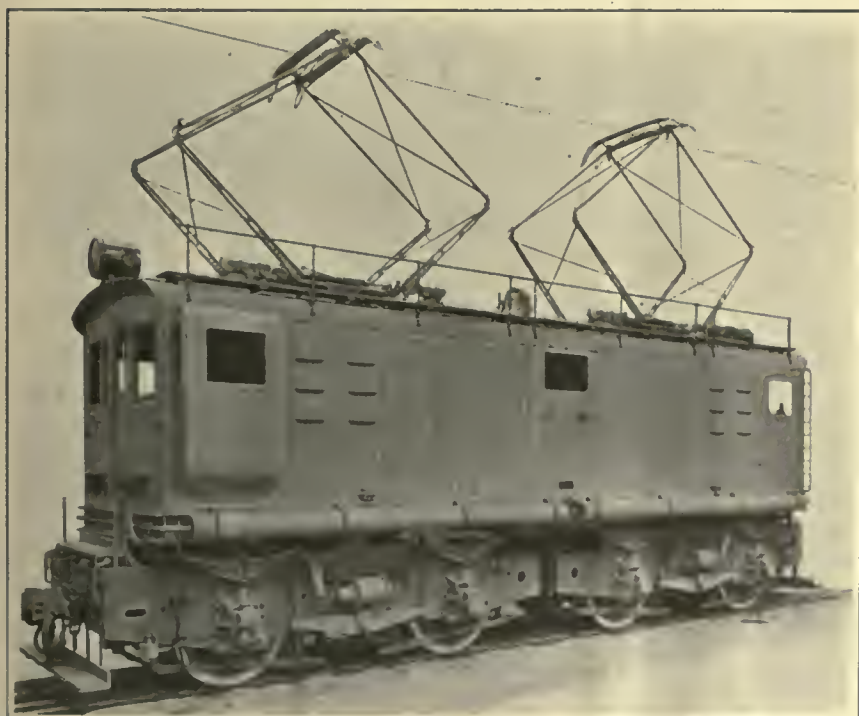
Carry-over orders and inquiries now in the market indicate that the average percentage of operations of the J. G. Brill Company this year will exceed that of 1924. This expected increased operation applies not only to the building of street cars, but also to other modes of transportation, such as gasoline-propelled cars for steam railroads and buses.

Standard Invoice Will Be Discussed at Conference

A national conference called by R. M. Hudson, chief of the Division of Simplified Practice of the Department of Commerce, will be held under the auspices of the National Association of Purchasing Agents on Jan. 14 at the Commerce Building, Washington, D. C. For some time now 41 national trade associations have been giving considerable attention to the national standard invoice, purchase order and inquiry forms. Mr. Hudson in a letter of invitation to the conference says that the general adoption and use of the proposed standards will work toward the elimination of those wastes resulting from the present tremendous diversity

Metal, Coal and Material Prices

Metals—New York		Jan. 6, 1925
Copper, electrolytic, cents per lb.....		15 08
Copper wire base, cents per lb.....		12 25
Lead, cents per lb.....		10 02 1/2
Zinc, cents per lb.....		8 18
Tin, Straits, cents per lb.....		60 00
Bituminous Coal f.o.b. Mines		
Smokeloss mine run, f.o.b. vessel, Hampton Roads, gross tons.....		\$4 12 1/2
Somerset mine run, Boston, net tons.....		2 05
Pittsburgh mine run, Pittsburgh, net tons.....		1 62 1/2
Franklin, Ill., screenings, Chicago, net tons.....		1 95
Central, Ill., screenings, Chicago, net tons.....		1 95
Kansas screenings, Kansas City, net tons.....		2 50
Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.....		\$2 25
Weatherproof wire base, N. Y., cents per lb.....		20 00
Cement, Chicago net prices, without bags.....		2 20
Lined oil (5-lb. lots), N. Y., per gal.....		\$1 18
White lead in oil (100-lb. keg), N. Y., cents per lb., carload lots.....		0 16 20
Turpentine (bbl. lots), N. Y., per gal.....		0 91



English Built Locomotive for Montreal Harbor Commission

in the forms used for the purposes indicated. Many national organizations have been actively promoting the use of the standard invoice among their members. Secretary Chandler of the National Association of Purchasing Agents states that if the customers can save \$15,000,000 by the use of standard invoices, the sellers can save at least an additional 10 per. cent of that amount.

Rolling Stock

Madison Railways, Madison, Wis., plans to purchase 17 new cars, replacing some of its older cars. This policy was adopted following authorization by the Wisconsin Railroad Commission for a fare increase, referred to elsewhere in this issue.

Coast Cities Railway, Ashbury Park, N. J., will purchase seven light-weight, double-truck safety cars. The Board of Public Utility Commissioners has approved a car trust agreement between the company, operating in Monmouth County, N. J., and the J. G. Brill Company, Philadelphia, for the purchase. Under the agreement the company will issue 60 serial notes totaling \$77,635, of which \$65,909 is the principal and \$11,726 interest.

Manhattan Bridge Three-Cent Line, New York City, N. Y., suffered the loss of one car by fire in the carhouse at the Flatbush Avenue extension. The damage was estimated at between \$5,000 and \$6,000.

Sand Springs Railway, Tulsa, Okla., suffered the loss of its carhouse and machine shop by fire on Dec. 18. Sixteen passenger cars, one express car and an electric locomotive were destroyed with the building. The company was seriously handicapped in operation as it had only seven interurban cars left. Sleet and cold greatly handicapped firemen in combating the flames. The fire, caused by an overheated stove in an express car, caused a loss estimated at \$200,000.

Track and Line

San Diego Electric Railway, San Diego, Cal., has constructed an overhead viaduct crossing at Torquois Street, La Jolla, at a cost of \$40,000.

Dallas Railway, Dallas, Tex., will consider the extension of the State Street line on Capital Avenue between Haskell and Henderson Avenues in East Dallas. The proposed extension would be nine blocks and cost between \$30,000 and \$35,000. It would serve a district now without adequate railway connections.

Stockton, Cal.—The State Railroad Commission has authorized the construction of a subway under the Southern Pacific and Western Pacific rail crossings at Miner Avenue. The project involves an expenditure of \$308,000. By the terms of the decision the city, which was the applicant, was to pay 50 per cent of the construction cost, the Southern Pacific 30 per cent and the Western Pacific 20 per cent, all exclusive of paving expenses, which are to be borne by the city of Stockton.

Womelsdorf, Pa.—It is said that an electric railway will be constructed next spring from Womelsdorf, Berks County, to Kleinfeltersville, Lebanon County, at a cost of approximately \$300,000. This will make direct trolley connections between Reading and Harrisburg. The line will be 6.06 miles long. It will start at Womelsdorf and go through Newmanstown, Millbach and Kleinfeltersville.

New York, N. Y.—The Board of Transportation issued an invitation to contractors to bid for the installation of tracks and other miscellaneous work in the construction of the Flushing extension of the Queensboro subway. The bids will be received and publicly opened by the Board of Transportation at 49 Lafayette Street, New York City, Jan. 9, 1925. Recently the board awarded a contract for the construction of foundations, retaining walls and embankment for the Corona storage yards, which will be connected by two spur tracks with the Flushing extension. The Flushing extension will be a three-track elevated railroad.

Power Houses, Shops and Buildings

Tennessee Electric Power Company, Chattanooga, Tenn., will erect shortly a one-story fireproof garage, 75 ft. x 100 ft., for its railway property. The estimated cost is \$15,000.

Boston, Mass.—It is decided that a station will be built at the corner of Charles and Cambridge Streets on the Boston Elevated line to Cambridge. The trustees of the Boston Elevated Railway have voted to accept the proposition. Plans for the station have the approval of the Public Utilities Department and of the Boston Transit Division. It is expected that the details will be worked out shortly and that the city of Boston will advertise for bids on the construction work.

Petaluma & Santa Rosa Railroad, Petaluma, Cal., has ordered from the Westinghouse Electric & Manufacturing Company a 300-kw. rotary converter for installation in a power substation which is to be erected at Forestville. The improvement will cost \$15,000. Delivery is expected May. 1.

Trade Notes

Mitchell-Rand Manufacturing Company, New York, N. Y., held its annual dinner of officers, salesmen and factory managers, Dec. 27, at the Building Trades Employers' Club. Previous to the dinner the regular monthly meeting of the salesmen was held in the offices of the company. After the dinner the officers of the company, salesmen, factory managers and guests attended a performance of "New Brooms" at the Fulton Theater.

Electric Service Supplies Company, Philadelphia, Pa., announces that it has assumed the exclusive sale and distribution of the entire output of the Franklin Porcelain Company, Norristown, Pa., manufacturer of high-voltage porcelain insulators and fittings. The modern plant of that company is devoted entirely to the production of

the highest quality wet process electrical porcelain for every purpose and is being greatly enlarged in anticipation of a substantial increase in volume of business.

Jackson & Moreland, Boston, Mass., engineers, announce the formation of a department particularly devoted to investigations and reports of a special nature, such as appraisals and rate studies, organization and personnel matters. This department is under the management of Frank M. Carhart.

American Brass Company, Bridgeport, Conn., has booked through the new Kenosha wire mill an order for shipment to the Illinois Central Railroad for the proposed electrification of that company's line out of the suburban district near Chicago. The order calls for products of the Anaconda Copper Mining Company, of which the American Brass Company is a subsidiary, as follows: 130 miles hard drawn grooved copper-trolley wire, 105 miles feeder strand and messenger wire and 82 miles grooved hitenso trolley wire.

Anton S. Rosing, heretofore assistant manager advertising and publications bureau of the Portland Cement Association, Chicago, has been appointed publicity manager of the Armco Culvert & Flume Manufacturers' Association, Middletown, Ohio, in charge of advertising, publications and other publicity work. Previous to joining the staff of the Portland Cement Association he was engaged in active construction work, principally railroad construction, and for two years was assistant professor of civil engineering at Michigan Agricultural College, Lansing.

New Advertising Literature

International Motor Company, New York, N. Y., has issued the anniversary number of the "Mack Bulldog." One of the pictures shows the original Mack Trucks, Inc. plant and working force.

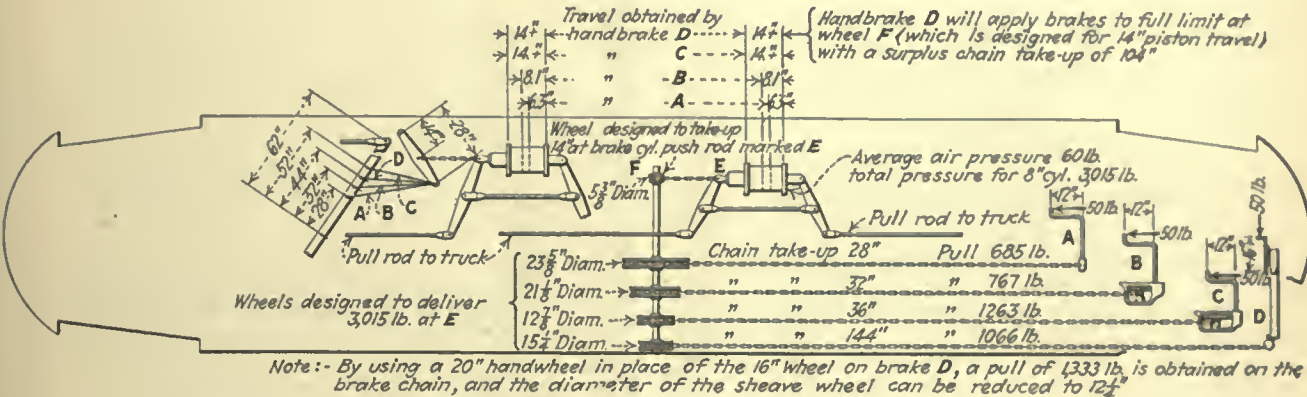
American Institute of Steel Construction, New York, N. Y., has issued "Steel Construction," a booklet which contains the institute's Standard Specification and Code of Standard Practice. The introduction of the book consists of a mathematical explanation of the development of the various formulas recommended in the Specification for the proper reduction of working stresses. A set of charts accompanies the explanation designed to eliminate a vast amount of mathematical calculation in connection with structural steel design. Data are given on action of structural steel members under varying conditions.

Electric Service Supplies Company, Philadelphia, Pa., has issued Bulletin No. 207, entitled "Cass Commutator Smoothing Stones." "Cass" is the new name for the old Aetna commutator smoothing stone.

Ohio Brass Company, Mansfield, Ohio, has issued a folder describing its new O-B trolley base, called Form 4, which has Timken roller bearings, special contact brushes, and a leather cup washer below the bottom bearing to act as a grease seal. The base is very compact and of light weight. It is intended particularly for use on small city cars.

The hand brake theory is here—

In a comprehensive study of the subject published in Electric Railway Journal, September 13, 1924, the author elaborates and illustrates clearly the fundamental theories underlying the installation and operation of hand brakes under various conditions. The diagram and tables below, are reproduced from the article.



Hand Brake Layouts for Cars with 8-In. Brake Cylinders

Type of Hand Brake	Designated by Letter	Pull Delivered by Hand Brake	Braking Power at E	Maximum Chain Pull Obtained by Hand Brake	Chain Pull Required by Hand Brake for 14 In. Push Rod Travel	Maximum Travel of Push Rod at Point E	Surplus Chain Take-Up	Deficiency of Chain Take-Up	Remarks
Ordinary staff.....	A	685 lb.	3,015 lb.	28 in.	62 in.	6.3 in.	.....	34 in.	55 per cent less than required
Peacock, size A-B.....	B	767 lb.	3,015 lb.	32 in.	55 in.	8.1 in.	.....	23 in.	42 per cent less than required
Peacock, size E.....	C	1,263 lb.	3,015 lb.	36 in.	34 in.	14.4 in.	2 in.	.....	5.8 per cent more than required
Peacock, staffless.....	D	1,066 lb.	3,015 lb.	144 in.	40 in.	14.4 in.	104 in.	.....	260 per cent more than required

PEACOCK STAFFLESS BRAKES



Adequate in practice and theory, too!

Analysis like the above indicates clearly that Peacock Staffless Brakes have more than ample chain winding capacity. Absolute limitation of piston travel, in the air-brake system may not infrequently require an emergency hand brake application, and hand brakes ought to be effective under all conditions.

It's easy to test it out. Take any car on the road and slack off the brake shoes until a piston travel of

nearly full stroke is attained. Then try your hand brake! Will it hold under these conditions? If not, ask yourself what use it is.

Peacock Staffless Brakes, because of their immense chain-winding capacity—will apply brakes and stop the car, no matter how much slack there may be. They are truly emergency brakes, because they operate successfully when other methods of controlling the car fail.

National Brake Company

890 Ellicott SquareBuffalo, N. Y.

Canadian Representative

Lyman Tube & Supply Co., Ltd., Montreal, Can.

Bankers and Engineers

Ford, Bacon & Davis Incorporated Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation

Engineers—Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

EXAMINATIONS REPORTS APPRAISALS
ON

INDUSTRIAL AND PUBLIC SERVICE PROPERTIES

NEW YORK

BOSTON

CHICAGO

THE BEELER ORGANIZATION

ENGINEERS AND CONSULTANTS

Traction-Traffic-Equipment-Power

COORDINATION OF SERVICE—IMPROVED OPERATIONS

INCREASED TRAFFIC—FINANCIAL REPORTS

APPRAISALS—MANAGEMENT

52 Vanderbilt Ave.

New York City

SANDERSON & PORTER ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT and POWER PROPERTIES

CHICAGO

NEW YORK

SAN FRANCISCO

ENGELHARDT W. HOLST

Consulting Engineer

Appraisals, Reports, Rates, Service Investigation,
Studies on Financial and Physical Rehabilitation
Reorganization, Operation, Management

683 Atlantic Ave., Boston, Mass.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS-APPRAISALS-RATES-OPERATION-SERVICE

JOE R. ONG

Consulting Transportation Engineer

Specializing in Traffic Problems and in Methods to
Improve Service and Increase
Efficiency of Operation

PIQUA, OHIO

STEVENS & WOOD, INC.

Design and Construction of Power Stations

Railroad Electrification, Industrial Plants

REPORTS AND APPRAISALS

Management and Financing of Utilities and Industrials

Mahoning Bank Bldg.

120 Broadway

Youngstown, O.

New York

Dwight P. Robinson & Company

Incorporated

Design and Construction of

Electric Railways, Shops, Power Stations

125 East 46th Street, New York

Chicago

Los Angeles

Youngstown

Montreal

Atlanta

Rio de Janeiro

Philadelphia

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells

Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management Operation Construction

43 Cedar Street, New York City

DAY & ZIMMERMANN, INC.

ENGINEERS

DESIGN - CONSTRUCTION - REPORTS

VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly Pass—Differential Fares

Ride Selling

143 Crary Ave., Mt. Vernon, N. Y.

Byllesby Engineering & Management Corporation

208 S. La Salle Street, Chicago

New York

Tacoma

The Most Successful Men in the Electric Railway

Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

C. B. BUCHANAN
President

W. H. PRICE, JR.
Sec'y-Treas.

JOHN F. LAYNG
Vice-President

BUCHANAN & LAYNG CORPORATION

Engineering and Management, Construction,
Financial Reports, Traffic Surveys
and Equipment Maintenance

BALTIMORE
825 Equitable Bldg.

Phone:
Hanover 2142

NEW YORK
49 Wall Street

JAMES E. ALLISON & CO.

Consulting Engineers

Specializing in Utility Rate Cases and
Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.

Bureau of Commercial Economics, Inc.

Industrial Engineers

Organization • Methods • Layout and Facilities
Public and Industrial Relations

72 West Adams Street • CHICAGO

HUMAN ENGINEERING

Railway Audit and Inspection Company, Inc.

Franklin Trust Building, Philadelphia

Boston
New Orleans

New York
Pittsburgh

BRANCHES

Baltimore
Chicago

Atlanta
St. Louis

Transmission Line and Special Crossing
Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.

Engineers and Contractors SYRACUSE, N. Y.

The Most Successful Men in the Electric Railway

Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

THE P. EDWARD WISH SERVICE

50 Church St.
NEW YORK

Street Railway Inspection
DETECTIVES

131 State St.
BOSTON

When writing the advertiser for information or
prices, a mention of the Electric Railway
Journal would be appreciated.



The
common sense
of
securing
good-will
and
the best
methods
to use

see
this
book
free

Just
off
the
press

Newspaper

Radio

Public Relations

A Handbook of Publicity

BY JOHN C. LONG

Manager of Educational Department,
National Automobile Chamber of Commerce;
previously on editorial staff of *Cass Journal Company*.

218 pages, 5x8, illustrated, \$3.00 net, postpaid.

Press Bureaus

Magazines

This book does not encourage puffery. "free" reading notices
nor the attempt to put over sales talks which belong in
advertising.

It tells you how to find out and present the news of your
business.

Every organization, every public utility and many individuals
engage in activities which have news value. PUBLIC RELA-
TIONS tells how to present this information to the public
with the best results.

It gives specific examples of successful campaigns. It de-
scribes the media of publicity. It discusses effective methods
for corporations, associations, retail enterprises and in-
dividuals.

The book tells you

—what the newspapers want;
—the needs of different newspaper
departments;
—what the 700 leading news-
papers are;
—how to use radio for publicity;
—how to run conventions and
banquets;

—how to organize a complete pub-
licity campaign;
—what the general magazines
want;
—what the opportunities of the
public platform are;
—how to use motion pictures for
publicity.

Moving Pictures

Platform

Examine it for 10 days free

The book will give you hundreds of valuable ideas and sug-
gestions that you will be able to put in good use.

See it for ten days free. See what it has for you. No need
to keep it unless you're convinced that it is a book you
want to have handy. Send the coupon—we'll send the book.

Send just this coupon

FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, N. Y.

Send me for 10 days' free examination Long's Public Relations.
\$3.00 net, postpaid.

I agree to remit for the book or to return it, postpaid, within 10
days of receipt.

Name

Address

Position

Company

(Books sent on approval to retail purchasers in U. S. and Canal
only.) E. 1-10-2



Collier Service

A nation-wide
organization
building and
sustaining 'car
card advertising
space values



Barron G. Collier, Inc.

Candler Bldg.
New York

The Chassis First!

For satisfactory, profitable bus transportation the most important element is the chassis. It must be dependable, powerful, ready for constant service and capable of showing a low upkeep cost. It should therefore be a GMC.

For the skill and resources behind General Motors chassis have produced a unit that takes care of its job in a very impressive fashion, no matter how strenuous the work it is called on to do.

Every GMC part is designed overstrength — transmission, clutch, rear axle, frame, everything. The engine is full pressure lubricated. Main bearings are oversize. GMC is designed to do better work, longer!

GMC is now building to the specifications of electric and steam railways, buses for auxiliary routes. Ask for a study and recommendation to fit your needs.

GENERAL MOTORS TRUCK COMPANY
Division of General Motors Corporation
PONTIAC, MICHIGAN

**General Motors
Trucks**



*Clip and
mail*

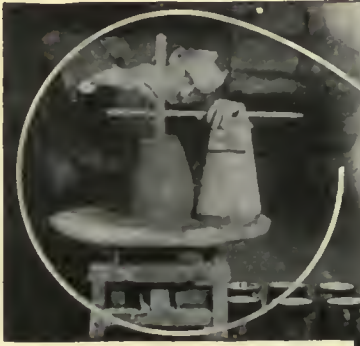
General Motors
Truck Co.,
Dept. —,
Pontiac, Mich.

Send me the GMC catalog.

Name.....

Business.....

Address.....



On the job at Newark Bay. By means of this simple slump test, any competent inspector can easily control the quantity of mixing water and, therefore, the strength of the resulting Concrete.



The new, four-track Central Railroad of New Jersey Bridge over Newark Bay will be located 100 feet north of the present structure. The new track level will be 30 feet higher than the old.

New structure is to be 7500 feet long with Concrete Piers weighing 1500 tons each.



Quality Control in the Field

Central Railroad of New Jersey engineers believe in putting the laboratory to work right on the job.

In the Concrete construction, shown above, they are regularly applying approved methods of field control to keep the quality of the Concrete uniform and particularly to maintain desired strength.

Strengths are verified at regular intervals by testing field cylinders.

Proportions of fine and coarse aggregates are accurately determined by fineness modulus.

Slump tests are being made daily to control consistency.

This is only one of many jobs where the most modern field methods of control are directly helping to assure better Concrete with greatest economy.

* * *

The work on the Newark Bay Bridge is being done under the direction of A. E. Owen, Chief Engineer, J. J. Yates, Bridge Engineer, and H. E. Van Ness, Construction Engineer, Central Railroad of New Jersey.

Let us tell you more about the practical advantages of field methods of quality control. Write the nearest office listed below for your free copy of "Concrete Data for Engineers and Architects."

PORTLAND CEMENT ASSOCIATION

A National Organization to Improve and Extend the Uses of Concrete

Atlanta
Birmingham
Boston
Charlotte, N. C.
Chicago
Dallas

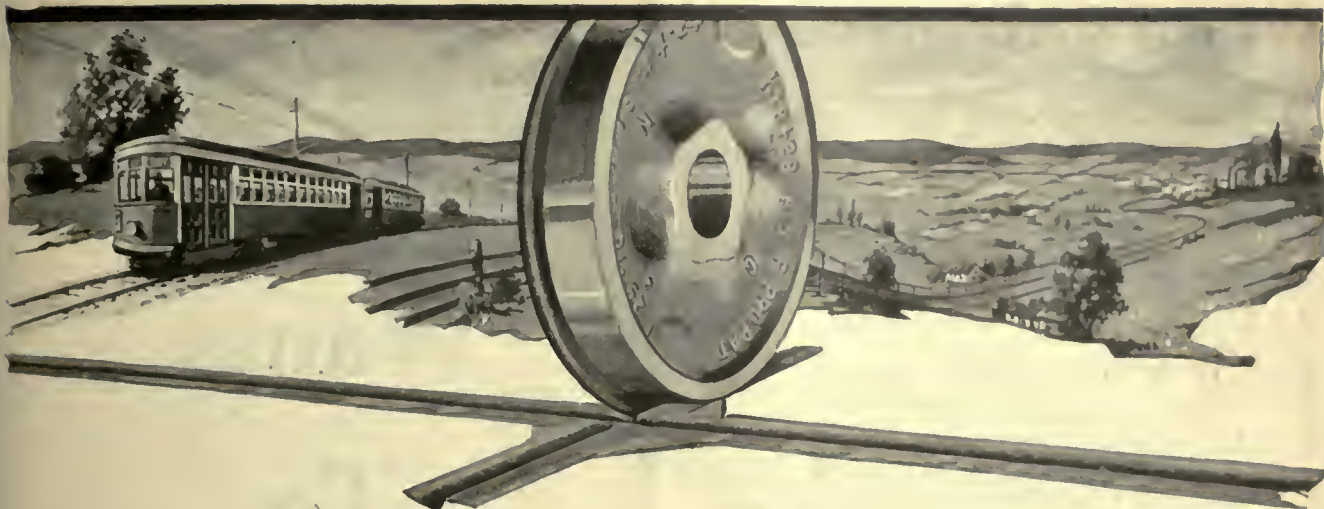
Denver
Des Moines
Detroit
Helena
Indianapolis
Jacksonville

Kansas City
Los Angeles
Memphis
Milwaukee
Minneapolis
New Orleans

New York
Oklahoma City
Parkersburg
Philadelphia
Pittsburgh
Portland, Oreg.

Salt Lake City
San Francisco
Seattle
St. Louis
Vancouver, B. C.
Washington, D. C.





No Chips! —from this old block

MANY a weary mile has it traveled. Crossings and frogs have pounded it. Bad joints have tried its metal to the very core. Yet to the end of its span of life, the toughened tread and flange remain intact.

What does it profit to buy a cheaper wheel, and spend several times the saving in re-turning? The cost of one trip to the machine shop is more than enough to pay the difference for Davis "One-Wear" Steel Wheels. Their super-hardened high manganese, heat-treated treads and flanges are the best resistant to chipping yet developed.

American Steel Foundries
NEW YORK CHICAGO ST. LOUIS

DAVIS
"ONE-WEAR"
STEEL WHEELS

WHEN RAILWAY MEN

in general, study the question of *wood durability* for other purposes, as carefully as *Railway Signal* men have studied it for *Trunking* and *Capping*, there will be a lot more

"ALL-HEART" "TIDEWATER" **CYPRESS** "THE WOOD ETERNAL"

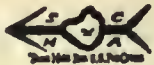
used for *Fencing, Ties, Car Material, Station Construction* and similar railroad requirements, *to the very great economy of the companies using it.*

The long service which "*All-Heart*" *Tidewater Cypress* gives,

**SAVES LABOR COSTS
FOR RENEWALS AND
REPLACEMENTS**

—big items in themselves.

"*All-Heart*" *Tidewater Cypress* comes nearer being decay proof than any other wood.

This mark  on every timber, board and bundle of Cypress is your *insurance of true replacement economy.*

The data in support of these facts will be promptly furnished upon request.

SOUTHERN CYPRESS MFRS.' ASSN

1265 Poydras Building, New Orleans La., or
1265 Graham Building, Jacksonville, Fla.



Some One Wants To Buy

the equipment or machinery that you are not using. This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

Sell it

before depreciation
scraps it.

*The Searchlight Section is
helping others—*

Let it help you also

TRACK FOUNDATION

The Source of Good or Evil

Concrete properly protected in Track Foundation becomes a source of good. Unprotected, it leads to all kinds of Evil. The Dayton Tie supplies the necessary protection to concrete, to make it a source of good. Without the shock absorbing elements, concrete disintegrates and becomes a source of Evil.

Let us tell you in detail why concrete is the best foundation for track, and why The Dayton Resilient Shock Absorbing Tie is the only substitute that will preserve this, *the best track foundation.*

THE DAYTON MECHANICAL TIE CO.

707 Commercial Building, Dayton, Ohio

DAYTON *Resilient* TIE



SILENT!

Silent, smooth meshing gears minimize wear, tear, rattle, vibration and the resultant maintenance expenses.

NUTTALL HELICAL GEARS

Almost unbelievably quiet and smooth, Nuttall Helical gears are peculiarly suited to electric railway service.

Being scientifically correct in design, forged and heat-treated, Nuttall Gears are exceptionally enduring. They are guaranteed to last at least four times as long as ordinary gears and remain quiet and smooth in operation.

Nuttall gears will lengthen the life of equipment and cut gear costs in the bargain. Our free gear book tells you why.

R.D. NUTTALL COMPANY
PITTSBURGH  PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.



Quality Cars for Detroit

The illustration shows one of the twenty-five new Peter Witt type cars now being delivered to the Detroit Municipal Railways, equipped with St. Louis equalized trucks.

St. Louis "Quality Built" cars are used by the principal electric railways throughout the U. S. Every car is built with the same high quality of workmanship.

Write for specifications

Quality **St. Louis Car Company** **Safety**
 St. Louis, Mo.
"The Birthplace of the Safety Car"

Is Money Ever "Spent" for Advertising?

A young and energetic executive took hold of a fine old business in New York.

"What this business needs," he told himself, "is a place in the mind of the public."

And deliberately he set out to sacrifice the greater volume of his profits and invest the sacrifice into the building of good will.

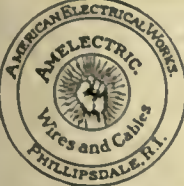
He did. And to this old business, advertising was the breath of life.

For six months had not passed before the business had grown so that the

advertising cost was a smaller percentage than ever it had been, and, because of a larger volume, the shop effected economies and gave far superior service.

That was five years ago. Today a certain percentage is spent, or supposed to be spent, for advertising. But as fast as the appropriation is spent, the more the business increases; and the more that the business increases, the smaller the percentage becomes.

Is money ever "spent" for advertising?



AMELECTRIC PRODUCTS
BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

Reg. U. S. Pat. Office
Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams;
Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

ELRECO TUBULAR POLES



COMBINE
Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street

THE WORLD'S STANDARD
"IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.
Irvington, N. J.

Sales Representatives in the Principal Cities

We are prepared
to handle any high grade proposition where
VARNISHED CAMBRIC
Wires and Cables
are required.

When using *quality* Wires and Cables use *quality* Tapes.
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes.

THE OKONITE CO., Passaic, N. J.
Incorporated 1884



Sales Offices: New York—Atlanta—
Pittsburgh—San Francisco.
Agents: Central Electric Co., Chicago,
Ill.; Pettibell-Andrews Co., Boston,
Mass.; The F. D. Lawrence Electric
Co., Cincinnati, Ohio; Novelty Elec-
tric Co., Philadelphia, Pa.
Canadian Representatives: Engineering
Materials Limited, Montreal.

TRADE



ANDERSON

Send for Latest Quotations
Main Office and Factory, Boston, Mass.

MARK



ROEBBLING
ELECTRICAL WIRES AND CABLES

John A. Roebbling's Sons Company
Trenton, New Jersey J-1707

Chapman
Automatic Signals
Charles N. Wood Co., Boston



ANACONDA
TROLLEY WIRE

ANACONDA COPPER MINING COMPANY
Conway Building, Chicago, Ill.

THE AMERICAN BRASS COMPANY
General Offices, Waterbury, Conn.



STANDARD
Underground Cable Company
Electric Wires and Cables of Quality

Branch Offices:
Boston Philadelphia Pittsburgh St. Louis New York
Washington Chicago Detroit San Francisco

PEIRCE
Railway Feeder Pins

A strong Forged Steel Pin designed for heavy duty.
Their low cost permits their use over the entire system.

HUBBARD & COMPANY
PITTSBURGH CHICAGO



AUTOMATIC SIGNALS
Highway Crossing Bells
Headway Recorders
Flasher Relays

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.



Shaw Lightning Arresters
*Standard in the Electric Industries
for 35 years*

Henry M. Shaw
150 Coit St., Irvington, Newark, N. J.

Arc Weld Rail Bonds

AND ALL OTHER TYPES
Descriptive Catalogue Furnished

American Steel & Wire Company

Chicago
New York
Boston
Cleveland
Pittsburgh
Denver
U. S. Steel Products Co.
San Francisco Los Angeles Portland Seattle

'CARNEGIE'
for
**WHEELS
AXLES
RAILS
CROSS TIES**



Carnegie Steel Company
PITTSBURGH, PENNA.

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa.

Sales Offices:

Atlanta Chicago Cleveland New York
Philadelphia Pittsburgh
Pacific Coast Representatives:
United States Steel Products Company
Los Angeles Portland San Francisco Seattle

Export Representatives:

United States Steel Products Company, New York, N. Y.

BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of

Special Work for Street Railways

Frogs, Crossings, Switches and Mates

Turnouts and Cross Connections

Kerwin Portable Crossovers

Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

B. A. HEGEMAN, Jr., President C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering

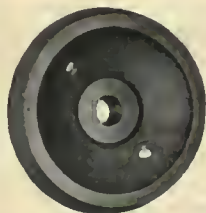
National Railway Appliance Co.

Grand Central Terminal, 432 Lexington Ave., Cor. 43rd St., New York
Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and
Change Maker Field Coils
The Aluminum Snow Plows
Walter Tractor Snow Plows
Cutler-Hammer Electric
Heaters
Pittsburgh Forge & Iron
Co.'s Products
Genesco Paint Oils
E. Z. Car Control Corpora-
tion's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s
Single and Double Deck
Busses

Economy Electric Devices
Co.'s Power Saving and
Inspection Meters
Anglo-American Varnish Co.,
Varnishes, Enamels, etc.
Gilmer Multiple Safety Step
Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co.,
Springs
Turnstile Car Corporation's
Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device



*Cambria Rolled Steel
Electric Car Wheels*

Best for Longer Service

Other products for the electrical field includes axles, armature shafts, rails, spikes, track work, splice bars, bolts, tie plates, tie rods, pole line material, sheets, magnet steel and gear blanks.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

BETHLEHEM

Advertisements for the Searchlight Section

Can be received at the New
York Office of Electric
Railway Journal
until 10 a. m.

Wednesday

For issue out Saturday



THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of
Water Tube Boilers
of continuing reliability

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 3001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 305 Gasco Building



WORKS

Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-6 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Agular 104
SAN JUAN, PORTO RICO, Royal Bank Building

OXYGEN, ACETYLENE, HYDROGEN for cutting, welding, etc.

Quick shipment and low prices also on cylinders, valves,
torches, regulators and supplies.

INTERNATIONAL OXYGEN COMPANY

Main Offices: Newark, N. J.

Branch Offices: New York Pittsburgh Toledo

RAMAPO AJAX CORPORATION

Ramapo Automatic
Return Switch
Stands
for Passing
Sidings



RACOR Tee Rail
Special Work
Manganese
Construction

GENERAL OFFICES: HILBURN, NEW YORK

Chicago New York Superior, Wis. Niagara Falls, N. Y.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines,
Condensers, Gas and Oil Engines, Air Compressors,
Air Brakes

ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed.
Up-to-date and economical.

Alumino-Thermic Corp., Roselle Park, N. J.

RAILWAY UTILITY COMPANY

CAR COMFORT WITH
UTILITY

HEATERS
REGULATORS
VENTILATORS

141-151 West 29th St.
Chicago, Ill.

Write for
Catalogue

1328 Broadway
New York, N. Y.

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill
differ only in magnitude; small orders command our utmost care
and skill just as do large orders. CAMERON quality applies to
every coil or segment that we can make, as well as to every
commutator we build. That's why so many electric railway men
rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts

Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We
carry 40 different sizes of case hardened pins in stock. Samples
furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

GALVANIZING HOT DIP

We have the largest jobbing galvanizing plant and hot-dip in the United
States. We guarantee our galvanizing to stand eight one minute dips in
the Standard Copper Sulphate Solution Test. Galvanized Products furnished.

JOSEPH P. CATTIE & BROTHERS
Gaul and Letterly Sts., Philadelphia, Penna.

HORNE & EBLING CORPORATION

50 CHURCH ST.,

NEW YORK, N. Y.

Brass Hardware
For Cars and Buses

Motor and Controller
Parts



Sterling Trolley Bases
and Brakes

Mall. Iron and Brass
Castings

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

NEW and RELAYING RAILS

1 TON OR 1000

TRACK
EQUIP-
MENT

LB FOSTER CO.

RAIL
ACCESS-
ORIES

PITTSBURGH - PENNSYLVANIA

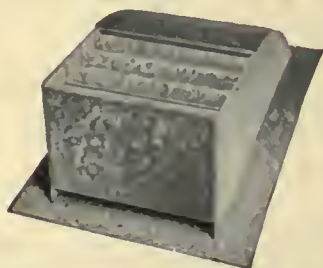
NEW YORK - JERSEY CITY - PHILADELPHIA - HAMILTON, O.



Car Heating and Ventilation

are two of the winter problems that you must
settle without delay. We can show you how
to take care of both, with one equipment.
Now is the time to get your cars ready for
next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.



Type "A" for cars having small roof radius. One of a variety for street car and bus use.

Take the Stale Air Out of Your Cars!

Poorly ventilated cars are apt to become poorly patronized cars.

N-L Ventilators change all the air in the car many times an hour. Nothing but pure air can get in—no dust, rain or snow.

In use by leading street and suburban railways. Ask for copy of "Superior Ventilation."



THE NICHOLS-LINTERN CO.

7960 Lorain Ave.

Cleveland, Ohio

Represented in Canada by
Railway & Power Engineering Corp., Toronto, Ontario

"Longwear" Pins and Bushings Hard—Accurate—Uniform



Renewal Materials
for Peckham and
other Trucks
Castings—Forgings
Springs

E. G. Long Company

50 Church Street, New York, N. Y.

Play for safety—
plus resiliency—
plus long life

By specifying

FORT PITT SPRINGS

FORT PITT SPRING &
MFG. CO.
Pittsburgh, Pa.



HALE-KILBURN CAR SEATS

For Every Class of Service

General Offices and Works: Philadelphia

Offices: New York, Chicago, St. Louis, Washington, San Francisco

PROVIDENCE FENDERS

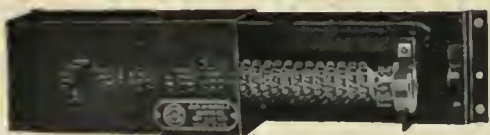
H-B

LIFE GUARDS

The Consolidated Car Fender Co., Providence, R. I.

Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No.

478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

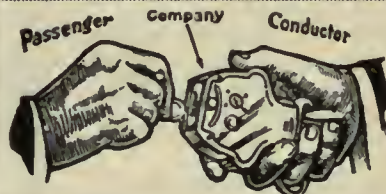
Let Us Tell You of Our Especially Designed Fare Box for the

ONE MAN CAR

THE CLEVELAND FARE BOX COMPANY

Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd., Preston, Ontario



Direct
Automatic
Registration
By the
Passengers

Rooke Automatic
Register Co.
Providence, R. I.



Gets Every Fare
PEREY TURNSTILES
or PASSIMETERS

Use them in your Prepayment Areas and
Street Cars

Perey Manufacturing Co., Inc.
101 Park Avenue, New York City

100 New Users in the Last Nine Months
KASS SAFETY TREADS

HIGH

in efficiency and lasting qualities

LOW

in weight, initial and upkeep costs

Morton Manufacturing Co., Chicago



Electrical Insulation and Headlinings
THE PANELYTE COMPANY, Trenton, N. J.

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD.

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 3 cents a word, minimum charge \$2.00.

Proposals, 10 cents a line an insertion.

INFORMATION

For Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH

1 to 3 inches 84.50 a line

4 to 7 inches 42.25 a line

8 to 14 inches 28.17 a line

Rates for larger spaces, or year rates, are on request.

An advertising inch is measured vertically in column, 3 columns 101 lines a line.

R.F.J.

POSITIONS WANTED

AUDITOR, broad and thorough experience in financing and accounting; all branches railway, electric and gas utilities, open for engagement. Possess initiative and capable of assuming full control of all accounting matters. PW-758, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

EXECUTIVE, Urban and Interurban. Wide successful experience in all departments of construction and operation. PW-740, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

EXECUTIVE, twelve years' experience in engineering and operation, city and interurban; first-class record and references. PW-757, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

GENERAL shop foreman, city or interurban, 18 years' successful experience in maintenance operation and general shop management. At present employed. Personal reasons for change. PW-767, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

GENERAL superintendent, chief engineer, or superintendent of equipment, technical graduate, eighteen years' experience on construction, operation, maintenance of power, shops, track, line buses. Highly successful in handling men and materials and producing results, fine references. Personal reasons for desiring change. PW-768, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

MASTER mechanic, with broad experience and successful record backed by prominent executives in railway field, desires change. PW-769, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

CAR WHEEL BORER

For Immediate Delivery

1—48-in. Niles Car Wheel Boring Machine without derrick, otherwise complete; good condition.

POWER SUPPLY COMPANY
Terre Haute, Indiana



In Small Lots
As Well As Large

THERE is a class of rail buyers, occasionally in need of only small tonnages, who are paying a premium on their purchases elsewhere because they believe that we do not seek their patronage.

We maintain a large organization to give efficient service on small orders. Our tremendous volume gives us unequalled buying power and saves our clients money regardless of the tonnage required.

Immense stocks at strategic distributing points provide complete assortments near you. This adds a saving in freight to our already unbeatable prices.

Next time you need rails, let us know your requirements.

We guarantee the same prompt, efficient service to all.

HYMAN-MICHAELS COMPANY

"The House of Dependable Service"

122 South Michigan Avenue, Chicago

Dealers in New and Relaying Rails,
Locomotives and Railway Equipment

District Offices: New York, Woolworth Bldg.;
St. Louis, Railway Exchange Bldg.; Pittsburgh, First Nat'l Bank Bldg.;
San Francisco, 234 Stewart St.

Yards: St. Louis, East Chicago, Ind., McKee's Rocks, Pa., San Francisco.

Cable Address: "Hymanmikol"

World's Largest Distributors of Rails

"SEARCHLIGHT"

IS
Opportunity
Advertising

—to help you get
what you want.

—to help you sell
what you no
longer need.

Take Advantage Of It

For Every Business Want

"Think SEARCHLIGHT First"

0107

FOR SALE

Two Single Truck Snow Sweepers

Complete
Ready for operation
Splendid condition

Transit Equipment Co.

Cars — Motors
501 Fifth Avenue, New York

WE WANT TO BUY

30—West. 306-C.V.-4

MOTORS

Have you any to offer?

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

RAILS

New Relaying

FROGS
SWITCHES
SPICE BARS
BOLTS
NUTS
TIE PLATES
RAIL
BRACES

All Rails and
Track Materials
subject to inspection
and approval at
destination.

L.B. Foster Co.

PITTSBURGH-PA
ALSO NEW YORK

UNUSUAL 70 LB.

RAILS

ASCE Section—Low Price

ZELNICKER IN ST. LOUIS

Steel Piling—Cars—Track Material, Etc.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Ancora, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch
Stands
Ramapo Ajax Corp.

Automatic Safety Switch
Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
St. Louis Car Co.
Westinghouse E. & M. Co.

Axles, Car Wheels
Bethlehem Steel Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co.,
The

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
More-Jones Brass & Metal
Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Bearings, Center and Roller
Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
St. Louis Car Co.

Bearings, Roller
Norma-Hoffman Bearings
Corp.

Bollers
Babcock & Wilcox Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Book Publishers
McGraw-Hill Book Co.

Brackets and Cross Arms
(See also Poles, Ties,
Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Brakes, Brake Systems and
Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.

Buses, Motor
Brill Co., The J. G.
General Motors Corp.
International Motor Co.
St. Louis Car Co.

Bushings, Case Hardened and
Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Long Co., E. G.
St. Louis Car Co.

Cables. (See Wires and
Cables)

Camble Tapes, Yellow and
Black Varnish
Irvington Varnish & Ins.
Co.

Carbon Brushes (See
Brushes, Carbon)

Cars, Dump
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.

Car Lighting Fixtures
Elec. Service Supplies Co.

Car M't's Ass'n
Railway Car M't's Ass'n
Car Panel Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Cars, Passenger, Freight,
Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Gas, Rail
Brill Co., J. G., The
St. Louis Car Co.

Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
Brill Co., J. G., The
General Electric Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Castings, Brass, Composition
or Copper
Anderson Mfg. Co., A. &
J. M.
More-Jones Brass & Metal
Co.

Castings, Gray Iron and
Steel
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

Castings, Malleable and
Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
Horne & Ebling Corp.
St. Louis Car Co.

Catchers and Retrievers,
Trolley
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Ceilings, Plywood, Panels
Haskelite Mfg. Co.

Cement Products
Portland Cement Assn.

Change Carriers
Cleveland Fare Box Co.

Circuit-Breakers
Anderson, A. & J. M. Mfg.
Co.
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for
Wires and Cables
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers Track
(See also Snow-Plows,
Sweepers and Brooms)
Brill Co., The J. G.
St. Louis Car Co.

Clesters and Sockets
General Electric Co.

Coal and Ash Handling (See
Conveying and Hoisting
Machinery)

Coil Banding and Winding
Machines
Elec. Service Supplies Co.

Coils Armature and Field
General Electric Co.
Westinghouse E. & M. Co.

Coils, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Weappers
Cleveland Fare Box Co.

Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Tr. Br. Co.

Condenser Papers
Irvington Varnish & Ins. Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Connectors, Solderless
Frankel Connector Co.
Westinghouse E. & M. Co.

Connectors, Trailer Car
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Copper Wire
Anaconda Copper Mining
Co.

Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co.,
The
Roebbling's Sons Co., John
A.
St. Louis Car Co.
Samson Cordage Works

Cord Connectors and
Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing, Frog & Switch
Ramapo Ajax Corp.

Crossing, Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.

Crossings
Ramapo Ajax Corp.

Crossings, Track (See Track,
Special Work)

Crossings, Trolley
Ohio Brass Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.

Dealer's Machinery
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

Derailing Devices (See also
Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Elec. Service Supplies Co.

Detective Service
Wish-Servic, P. Edward

Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
St. Louis Car Co.

Doors & Door Fixtures
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Morton Mfg. Co.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.

Ears
Ohio Brass Co.

Electrical Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebbling's Sons & Co.,
J. A.

Electric Grinders
Western Electric Co.

Engineers, Consulting, Con-
tracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Buchanan & Layne Corp.
Bureau of Commercial
Economics, Inc.
Bylesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Jos. R.
Railway Audit & Inspec-
tion Co.
Richey, Albert S.
Robinson & Co., Dwight
P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The
J. G.

Engineering
Equipment Engineering Co.
Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.

Fare Registers
Ohmer Fare Register Co.

Fences, Woven Wire and
Fence Posts
Amer. Steel & Wire Co.
Cyclone Fence Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Cords (See Cords)

Floodlights
Elec. Service Supplies Co.

Forgings
Brill Co., J. G., The

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Ramapo Ajax Corp.

Frogs, Track (See Track
Work)

Frogs, Trolley
Ohio Brass Co.

Fuses and Fuse Boxes
Consolidated Car Heat. Co.
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Refillable
General Electric Co.
Johns-Manville, Inc.

Galvanizers, Hot Dip
Jos. P. Cattle & Bros.

Gaskets
Westinghouse Tr. Br. Co.

Gas Producers
Westinghouse E. & M. Co.

Gas-Electric Cars
General Elec. Co.
Westinghouse E. & M. Co.

Gases, Car
Brill Co., The J. G.
St. Louis Car Co.

Gear Blanks
Bethlehem Steel Co.
Brill Co., J. G., The

Gear Cases
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion
Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gong (See Bells and Gongs)

Greases (See Lubricants)

Grinders and Grind Supplies
Indianapolis Switch & Frog
Co.

Guard Rail Clamps
Ramapo Ajax Corp.

Guard Rails, Tee Rail &
Manganese
Ramapo Ajax Corp.

Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Haps, Trolley
Elec. Service Supplies Co.
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Haskelite Mfg. Co.
Panelyte Co.

Heaters, Car (Electric)
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and
Water
Elec. Service Supplies Co.
Smith Heater Co., Peter

Hydraulic Machinery
Allis-Chalmers Mfg. Co.

Instruments Measuring, Test-
ing and Recording
Elec. Service Supplies Co.
General Electric Co.
Johns-Manville, Inc.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and
Tape
General Electric Co.
Irvington Varnish & Ins.
Co.
Okonite Co.

Stand. Underground Cable
Co.
Westinghouse E. & M. Co.

Insulating, Silk & Varnish
Irvington Varnish & Ins.
Co.

Insulation (See also Palats)
Electric Ry. Equipment Co.

Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins.
Co.
Okonite Co.

Insulation Slots
Irvington Varnish & Ins.
Co.

Insulators (See also Line
Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins.
Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Jacks (See also Cranes,
Hoists and Lifts)
Elec. Service Supplies Co.

Joints, Rail
(See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

Junction Boxes
Horne & Ebling Corp.
Std. Underground Cable
Co.

Lamps, Guards and Fixtures
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent
(See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Nichols-Lintern Co.
Ohio Brass Co.

Lanterns, Classification
Nichols-Lintern Co.

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

**COST MORE PER BRUSH
COST LESS PER CAR MILE**

W. J. Jeandron

345 Madison Avenue, New York

Pittsburgh Office: 634 Wabash Bldg.

Chicago Office: 1657 Monadnock Block

San Francisco Office: 525 Market Street

**Canadian Distributors: Lyman Tube & Supply Co., Ltd.,
Montreal and Toronto**

BRAKE SHOES

**AERA Standards
Brake Heads**



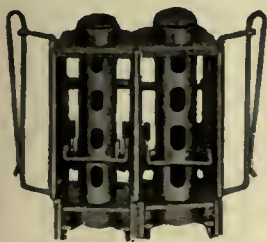
**Diamond "S" Steel Back and Lug Shoes
best for all equipment.**

**Manufactured and sold under U. S.
Patent and Registered Trade Mark.**

**American Brake Shoe and Foundry Co.
30 Church Street, New York**

332 So. Michigan Ave., Chicago

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

**JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.**

International Registers



**Type R-11
Double Register**

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

**Exclusive selling agents for
HEEREN ENAMEL BADGES.**

The International Register Co.

15 South Throop Street, Chicago, Illinois

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life **WITHOUT INJURY TO THE WIRE**. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the **LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD**.



**THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.**



**We make a specialty of
ELECTRIC RAILWAY
LUBRICATION**

**We solicit a test of TULC
on your equipment**

**The Universal Lubricating Co.
Cleveland, Ohio**

**Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City**

Lightning Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

**Line Material (See also
Brackets, Insulators,
Wires, etc.)**
Archbold-Brady Co.
Elec. Ry. Equipment
Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal
Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locomotives, Electric
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Lubricating Engineers
Universal Lubricating Co.

Lubricants, Oil and Grease
Universal Lubricating Co.

Manganese Parts
Bemis Car Truck Co.

Manganese Steel Castings
Wm. Wharton, Jr. & Co.

Manganese Steel Guards
Rampax Ajax Corp.

**Manganese Steel, Special
Track Work**
Bethlehem Steel Co.

Manganese Steel Switches
Frogs & Crossings
Bethlehem Steel Co.
Rampax Ajax Corp.

Meters (See Instruments)

Molding, Metal
Allis-Chalmers Mfg. Co.

**Motor Buses (See Buses,
Motor)**

Motors, Electric
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

Motors and Generators, Sets
Allis-Chalmers Mfg. Co.
General Electric Co.

Motormen's Seats
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

Nuts and Bolts
Barbour-Stockwell Co.
Bemis Car Truck Co.
Bethlehem Steel Co.
Hubbard & Co.

Oils (See Lubricants).

**Omnibuses (See Buses,
Motor)**

Oxygen
International Oxygen Co.

**Oxy-Acetylene (See Cutting
Apparatus, Oxy-Acetylene)**

Packing
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

**Paints and Varnishes (Insu-
lating)**
Irvington Varnish & Ins.
Co.

**Paints and Varnishes for
Woodwork**
National Ry. Appliance Co.

Pavement Breakers
Ingersoll Rand Co.

Paving Material
Amer. Br. Shoe & Fdy. Co.

Pickup, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

**Pins, Case Hardened, Wood
and Iron**
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake
Co.

Pipe Fittings
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Rampax Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Sup. Co.

Pole Line Hardware
Bethlehem Steel Co.
Ohio Brass Co.

Poles, Metal Street
Elec. Ry. Equipment Co.
Hubbard & Co.

Pole Reinforcing
Hubbard & Co.

Poles & Ties Treated
Bell Lumber Co.
Weyerhaeuser Sales Co.

**Poles, Ties, Posts, Piling &
Lumber**
Bell Lumber Co.
Southern Cypress Migr'a
Asso.
Weyerhaeuser Sales Co.

Poles, Trolley
Bell Lumber Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.

Postheads
Okonite Co.

Power Saving Devices
National Ry. Appliance Co.
Railway Improvement Co.

Pressure Regulators
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Pumps
Allis-Chalmers Mfg. Co.

Pumps Vacuum
Ingersoll Rand Co.

Punches, Ticket
Intern'l Register Co., The
Wood Co., Chas. N.

Rail Braces & Fastenings
Rampax Ajax Corp.

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.

Rail Joints—Welded
Lorain Steel Co.

Rails, Relaying
Foster Co., L. B.
Hyman-Michaels Co.

Rails, Steel
Bethlehem Steel Co.
Carnegie Steel Co.
Foster Co., L. B.

**Railway Paving Guards,
Steel**
Godwin Co., Inc., W. S.

Railway Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Rollers
Brill Co., The J. G.
Elec. Service Supplies Co.
McGuire-Cummings Mfg.
Co.
St. Louis Car Co.

Registers and Fittings
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Rooke Automatic Register
Co.
St. Louis Car Co.

Reinforcement, Concrete
Amer. Steel & Wire Co.

**Repair Shop Appliances (See
also Coil Banding and
Winding Machines)**
Elec. Service Supplies Co.

**Repair Work (See also
Coils)**
General Electric Co.
Westinghouse E. & M. Co.

Replacers, Car
Elec. Service Sup. Co.

Resistances
Consolidated Car Heat. Co.

Resistance, Wire and Tube
General Electric Co.
Westinghouse E. & M. Co.

**Retrievers, Trolley (See
Catchers and Retrievers,
Trolley)**

Rheostats
General Electric Co.
Westinghouse E. & M. Co.

Roofing Car
Pantalone Co., Inc.

Roofs
Haskelite Mfg. Co.

Sanders, Track
Brill Co., The J. G.
Elec. Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

Sash Fixtures, Car
Brill Co., The J. G.
Horne & Ebling Corp.
St. Louis Car Co.

**Scrapers, Track (See Clean-
ers and Scrapers, Track)**

**Screw Drivers, Rubber
Insulated**
Elec. Service Sup. Co.

Seats, Bus
Brill Co., J. G., The
Heywood-Wakefield Co.
St. Louis Car Co.

Seats, Car (See also Rattan)
Brill Co., The J. G.
Heywood-Wakefield Co.
St. Louis Car Co.

Seating Materials
Brill Co., J. G.
Heywood-Wakefield Co.
Pantalone Co., Inc.
St. Louis Car Co.

Second Hand Equipment
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

Shades, Vestibule
Brill Co., The J. G.

Shovels
Brill Co., The J. G.
Hubbard & Co.

**Side Bearings (See Bearings,
Center and Side)**

Signals, Car Starting
Consolidated Car Heat. Co.
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.

Signals, Indicating
Nichols-Lintern Co.

**Signal Systems, Highway
Crossing**
Nachod Signal Co., Inc.
Wood Co., Chas. N.

Signal Systems, Block
Elec. Service Sup. Co.
Nachod Signal Co., Inc.

**Slack Adjusters (See Brake
Adjusters)**

Steel Wheels and Cutters
Anderson Mfg. Co., A. &
J. M.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal
Co.
Nuttall Co., R. D.

Smokestacks, Car
Nichols-Lintern Co.

Sockets & Receptacles
National Metal Molding Co.

**Snow-Plows, Sweepers and
Brooms**
Brill Co., The J. G.
Consolidated Car Fender Co.
McGuire-Cummings Mfg.
Co.
St. Louis Car Co.

**Soldering and Brazing Ap-
paratus (See Welding
Processes and Apparatus)**
Irvington Varnish & Ins.
Co.

Solderless, Connector
Frankel Connector Co.

Special Adhesive Papers
Irvington Varnish & Ins.
Co.

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co.

Spikes
Amer. Steel & Wire Co.

Splicing Composites
Westinghouse E. & M. Co.

**Splicing Sleeves (See Clamps
and Connectors)**

Springs, Car and Truck
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg.
Co.
St. Louis Car Co.

Sprinklers, Track and Road
Brill Co., The J. G.
McGuire-Cummings Mfg.
Co.
St. Louis Car Co.

Steel and Steel Products
Carnegie Steel Co.

Steps, Car
Brill Co., J. G., The
Morton Mfg. Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Stop Signals
Nichols-Lintern Co.

**Storage Batteries (See Bat-
teries, Storage)**

Strain, Insulators
Anderson, A. & J. M. Mfg.
Co.
Ohio Brass Co.

Strand
Roebbing's Sons Co., J. A.

Superheaters
Babcock & Wilcox Co.

**Sweepers, Snow (See Snow
Plows, Sweepers and
Brooms)**

Switches, Selector
Nichols-Lintern Co.

Switches, Tee Rail
Rampax Ajax Corp.

**Switches, Track (See Track
Special Work)**

Switches and Switchboards
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Tapes and Cloths (See Insu-
lating Cloth, Paper and
Tape)**

Tee Rail Special Track Work
Bethlehem Steel Co.
Rampax Ajax Corp.

Telephones and Parts
Elec. Service Supplies Co.

Terminals, Cable
Std. Underground Cable Co.

**Testing Instruments (See In-
struments, Electrical Meas-
uring, Testing, etc.)**

Thermostats
Consolidated Car Heat. Co.
Gold Car Heat. & Lig. Co.
Railway Utility Co.
Smith Heater Co., Peter

**Ticket Choppers & Dea-
stroyers**
Elec. Service Supplies Co.

Ties, Mechanical
Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co.

**Ties, Wood Cross (See Poles,
Ties, Posts, etc.)**

Tie Steel
Bethlehem Steel Co.

**Tools, Track & Miscella-
neous**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Hubbard & Co.

**Torches, Acetylene (See
Cutting Apparatus)**

**Towers and Transmission
Structures**
Archbold-Brady Co.
Westinghouse E. & M. Co.

Trackless Trolley Cars
Brill Co., J. G., The
St. Louis Car Co.

Track, Special Work
Barbour-Stockwell Co.
Bethlehem Steel Co.
Rampax Ajax Corp.

Transfer (See Tickets)

Transfer Tables
American Bridge Co.

Transformers
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Treads, Safety, Stair, Car
Step**
Morton Mfg. Co.

Trolley Bases
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal
Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Trolley Material, Overhead
Anderson, A. & J. M.
Mfg. Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal
Co.
Ohio Brass Co.

Trolley Wheel Bushings
More-Jones Brass & Metal
Co.

Trolley Wheels & Hubs
More-Jones Brass & Metal
Co.
Thornton Trolley Wheel Co.

**Trolley Wheels (See Wheels,
Trolley)**

Trolley Wire
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebbing's Sons Co., J. A.

Trucks, Car
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg.
Co.
St. Louis Car Co.
Taylor Elec. Truck Co.

Upholstery, Yellow & Black
Flexible Varnish
Irvington Varnish & Ins.
Co.

Turbines, Steam
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Turbines, Water
Allis-Chalmers Mfg. Co.

Turnstiles
Elec. Service Supplies Co.
Perry Mfg. Co., Inc.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Varnished Papers & Silks
Acme Wire Co.
Irvington Varnish & Ins.
Co.

Ventilators, Car
Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

Welded Rail Joints
Aluminum-Thermic Corp.
Ohio Brass Co.

Welders, Portable Electric
Ohio Brass Co.

Welding & Cutting Tools
International Oxygen Co.

**Welding Processes and
Apparatus**
Aluminum-Thermic Corp.
General Electric Co.
International Oxygen Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Wheel Guards (See Fenders
and Wheel Guards)**

**Wheel Presses (See Machine
Tools)**

Wheels, Car, Cast Iron
Bemis Car Truck Co.
Carnegie Steel Co.

Wheels, Wrought Steel
Carnegie Steel Co.

Wheels, Trolley
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal
Co.
Nuttall Co., R. D.
Star Brass Works.

Whistles, Air
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Wire Rope
Roebbing's Sons Co., J. A.

Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Roebbing's Sons Co., J. A.
Westinghouse E. & M. Co.
Std. Underground Cable
Co.

Tool Steel Face
as hard here as on the
very surface. (This is one
of the great difference
between tool steel
hardening and case
methods)



Cincinnati "Tool Steel" gears outlast

8 to 10 M-treated

and
are much stronger

Tool Steel Quality

The Tool Steel
Gear & Pinion Co.
CINCINNATI, O.



"Differential Two-Car Train. Trailer dumping load clear of trench."

DIFFERENTIAL CARS

Standard on Fifty Railways for

Track Maintenance	Track Construction
Ash Disposal	Hauling Crossties
Placing Ballast	Disposal of Waste
Coal Hauling	Snow Disposal
Concrete Materials to the Job	
Excavated Material to the Dump	

For Economy

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION
CAR-WHEEL TRUCK and TRACTOR

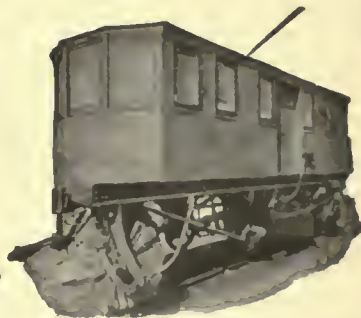
THE DIFFERENTIAL STEEL CAR CO.

Findlay, Ohio, U. S. A.

McGuire-Cummings Manufacturing Co.

General Offices:
111 W. Monroe St., Chicago, Ill.

Street Cars
Trucks
Snow Sweepers



M-J No. 10 Lubricated Type Trolley Wheel

Equipped in our No. 6 harp
on the bottle-shape principle
which prevents fouling or
catching overhead lines.

Detailed information and prices
on request.

Designed for high speed,
simplicity and economy.

More-Jones
Brass & Metal Co.
St. Louis, Mo.



ASTOUNDING Service Records are Being Made!

Traction companies are getting from
50,000 to 100,000 miles from the Thor-
nton Trolley Device. The long life of the
bearings, the perfectly balanced wheel
and the method of lubrication explain this
unparalleled service.

Letters from users ring with praise of the
Thornton. Reduce your repair bills and
road delays by using this device. Ask for
Bulletin.

Thornton Trolley Wheel Co.
Incorporated
Ashland, Kentucky



Phila. & West Chester Trac. Co's. New High-Speed Cars

Ten Center-entrance Center-exit cars, of the railway company's standard design, were recently delivered to the Philadelphia & West Chester Traction Co. These new cars, mounted on Brill High-speed Trucks, 27-MCB-2X, are noted for their smooth and comfortable riding action, to which their general popu-

larity with the public may be largely attributed.

Seating accommodations are provided for 62 passengers; the cars measure 48 feet long overall, 8 ft. 7 in. wide over posts, and equipped with quadruple 50 H.P. motors weigh 59,000 lb.

Catalog No. 277 contains a complete line of modern transportation equipment.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. —
ST. LOUIS, MO.

G. C. KUHLMAN CAR CO. —
CLEVELAND, OHIO.

WASON MANFO CO.
SPRINGFIELD, MASS.



— and now 150 more
 Another order just received,
 for 150 Equipments with 1 PC-10
 and 1 GE-259's makes a total
 of 648 G-E two-motor Equipments
 with 1 PC-10 Control system.
 important system.

100 More Equipments for the Interborough

3/1/24

The 100 two-motor GE-260 Equipments with PC-10 double-end Control recently ordered for the Subway Division of the Interborough Rapid Transit Company are duplicates of 398 Equipments which have been in service since 1917.



General Electric Company
 Schenectady, N. Y.
 Sales Offices in all Large Cities

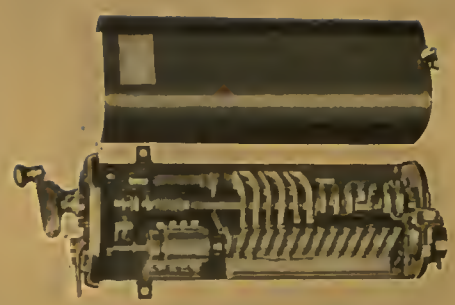
11-3



GE-260
 Motor



PC-10
 Controller



C-131
 Master Controller

GENERAL ELECTRIC

ELECTRIC RAILWAY JOURNAL



© Fairchild Aerial Camera Corporation.

The Public Square, Cleveland

In 1924 five miles of rail was renewed on the street branching off to the right at the top of the photograph. The original Steel Tie foundation was found intact and was not disturbed.

Investigate the newest developments in Steel Tie Construction

FIFTEEN years ago the first Steel Twin Ties were installed.

But more progress has been made in their use in paved track in the last year than in any other twelve months, in all that went ahead.

A method of renewing rail on a Steel Tie foundation which saves 75 per cent; provides for all new track as well as new alignment, new surface and new paving was developed in all details on over seven miles of track in 1924.

A new method of tamping, which locks the tie into the track foundation, reduces deflection and eliminates shrinkage, has been thoroughly tested and approved by users.

The tried and proven matters of cost and service are still worthy of complete investigation but certainly before proceeding with your 1925 track plans you should look into the newest developments in using Steel Twin Ties in paved track work.

Ask for the book "Steel Tie Track Construction" covering all details of initial and renewal construction and delivered prices for estimating.

The International Steel Tie Co.
Cleveland

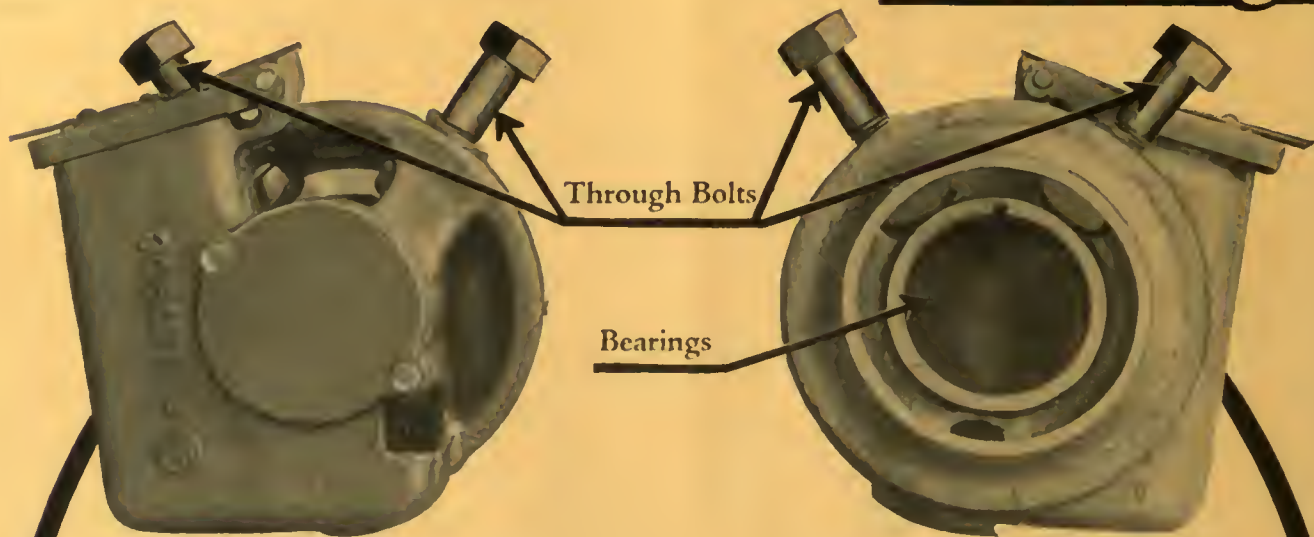
Steel Twin Tie Track

Renewable Track . . . Permanent Foundation

Railway

Renewal

Housings



Westinghouse Renewal Housings, which embody most of the characteristics found in the housings of modern Westinghouse Railway Motors, have been developed for many of the older types of Motors.

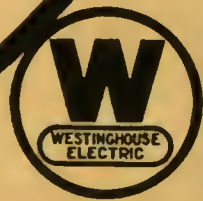
Be sure that the Renewal Housings you buy embody the following points:

**Through Bolts—Proper Bearing Fit—
Material which may be easily repaired.**

Cast-Steel Housings are the best. Malleable Iron has very good wearing qualities.

Both standard and over-size housings can be furnished. Standard size for unworn frame fits. Over-size for worn frame fits which must be bored out.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pennsylvania
Sales Offices in All Principal Cities of the
United States and Foreign Countries.



Westinghouse

X 78479

MORRIS BUCK
Managing Editor
JOHN A. MILLER, Jr.
Associate Editor
C. W. SQUIER
Associate Editor
G. J. MacMURRAY
News Editor

ELECTRIC RAILWAY JOURNAL

HARRY L. BROWN, Editor

HENRY W. BLAKE
Senior Editor
CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
MERRILL R. KNOX
Editorial Assistant
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

CONTENTS

JANUARY 17, 1925

Editorials85

Bond Testing and Maintenance Practice.....87
Types of bonds employed, causes of failure, methods of testing and replacement standards are summarized for 25 electric railways. While welded joints eliminate needs for bonds, there are occasional failures, so that checking of the return circuit is desirable.

Water Rheostat Used for Testing Circuit Breakers.....90

Pull-Ins Reduced 80 per Cent.....91
By installing armature dipping and baking facilities and by changing the kind of waste used in journal boxes the Harrisburg Railways eliminated the cause of many breakdowns.

Proper Equipment Improves Babbitt Room Results.....93

Inspecting Cars with Watt-Hour Meter.....95
The routine followed and the methods used by the Philadelphia Rapid Transit Company are described. Meters equipped with three inspection dials provide for three periods suitable for inspecting various parts of the car equipment.

Maintenance Repairs by Welding.....101
BY J. F. LINCOLN.

Experimental Locomotives for New York Central.....102

The Readers' Forum104

Equipment Maintenance Notes105

Association News and Discussions109

Grade Crossing Hazard Discussed by C.E.R.A.....109
Prevention of highway accidents a main topic at Dayton convention. Pick-up and delivery freight service and superpower developments complete two-day program.

Preventing Grade-Crossing and Highway Accidents.....111
BY WALLACE MUIR.

Increasing Confidence in Electric Railway Future.....111
BY HARRY REID.

Superpower and the Railways.....112
BY E. H. SNIFFIN.

Uniform Grade-Crossing Law Proposed.....113
BY GEORGE M. O'CONNOR.

American Association News114

News of the Industry115

Financial and Corporate121

Personal Mention124

Manufactures and the Markets.....125

McGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York

JAMES H. MCGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MUIR, Vice-President
E. J. MAHER, Vice-President
MARION BRITTON, Vice-President
JAMES H. MCGRAW, JR., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary

WASHINGTON:
Colorado Building
CHICAGO:
Old Colony Building
PHILADELPHIA:
Real Estate Trust Building
CLEVELAND:
Leader-News Building
ST. LOUIS:
Star Building
SAN FRANCISCO:
883 Mission Street
LONDON:
8 Boulevard Street, London, E. C. 4
Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations



Cable Address: "Machinist, N. Y."

Publishers of
Engineering News-Record
American Machinist
Power
Chemical and Metallurgical Engineering
Coal Age
Engineering and Mining Journal-Press
Ingeniería Internacional
Bus Transportation
Electric Railway Journal
Electrical World
Electrical Merchandising
Radio Relaying
Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
American Machinist—European Edition
(Published in London)

The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries \$3 (total \$7 or 28 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 25 cents.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place. Copyright, 1925, by McGraw-Hill Company, Inc.

Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office at New York, under the Act of March 3, 1879. Printed in U.S.A.

It Gives Him Ideas

"WHAT I like most about the JOURNAL," said the general manager of a small electric railway when talking to one of the editors of this paper a few days ago, "is the real usefulness of the articles. They give me ideas about things I might be able to do on this property. Of course, I read the news too and the personal items, but the articles that appeal to me most are those that describe improved methods I can use on my own property."

We are glad to know which parts of the paper appeal most to our various readers. We like to have them tell us these things, and we like to have them tell us if they find things they do not like in the paper.

Of course, not all of the readers are looking for the same thing. The master mechanic will hardly be interested in an article about welded track joints, nor the electrical engineer in a description of spray painting methods.

But we try to have articles in each issue that will be of interest to every department of the railway—useful articles that will give railway men ideas which they can put into effect on their own properties.

MORE THAN One Million Pounds Yearly

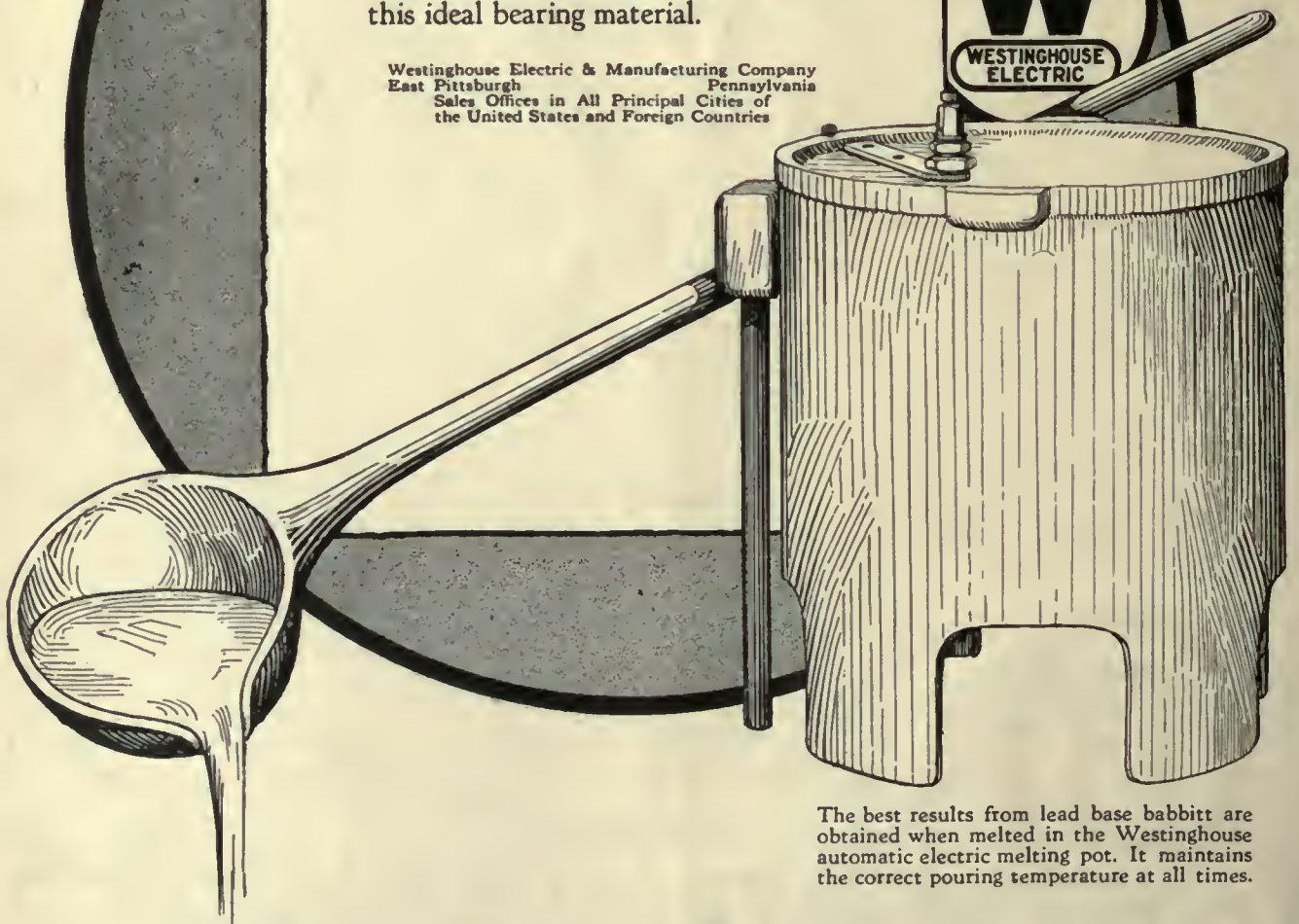
**Do You Rebabbitt Bearings Often
Or Do You Use
Westinghouse Number 25
Alloy Lead Base Babbitt?**

ONE Company found that the use of this babbitt for the bearings of a constantly used mill motor permitted six months longer service before rebabbiting was necessary.

You, too, can get increased bearing life by using No. 25 Alloy.

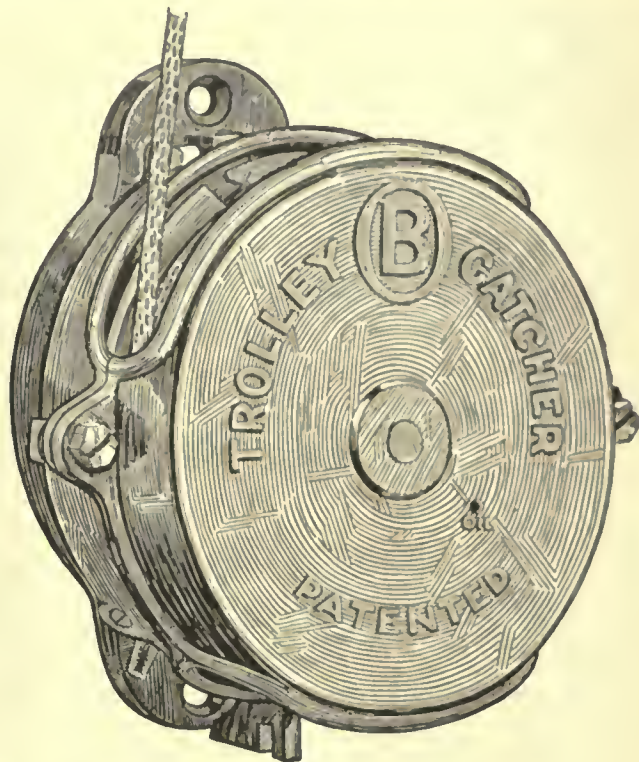
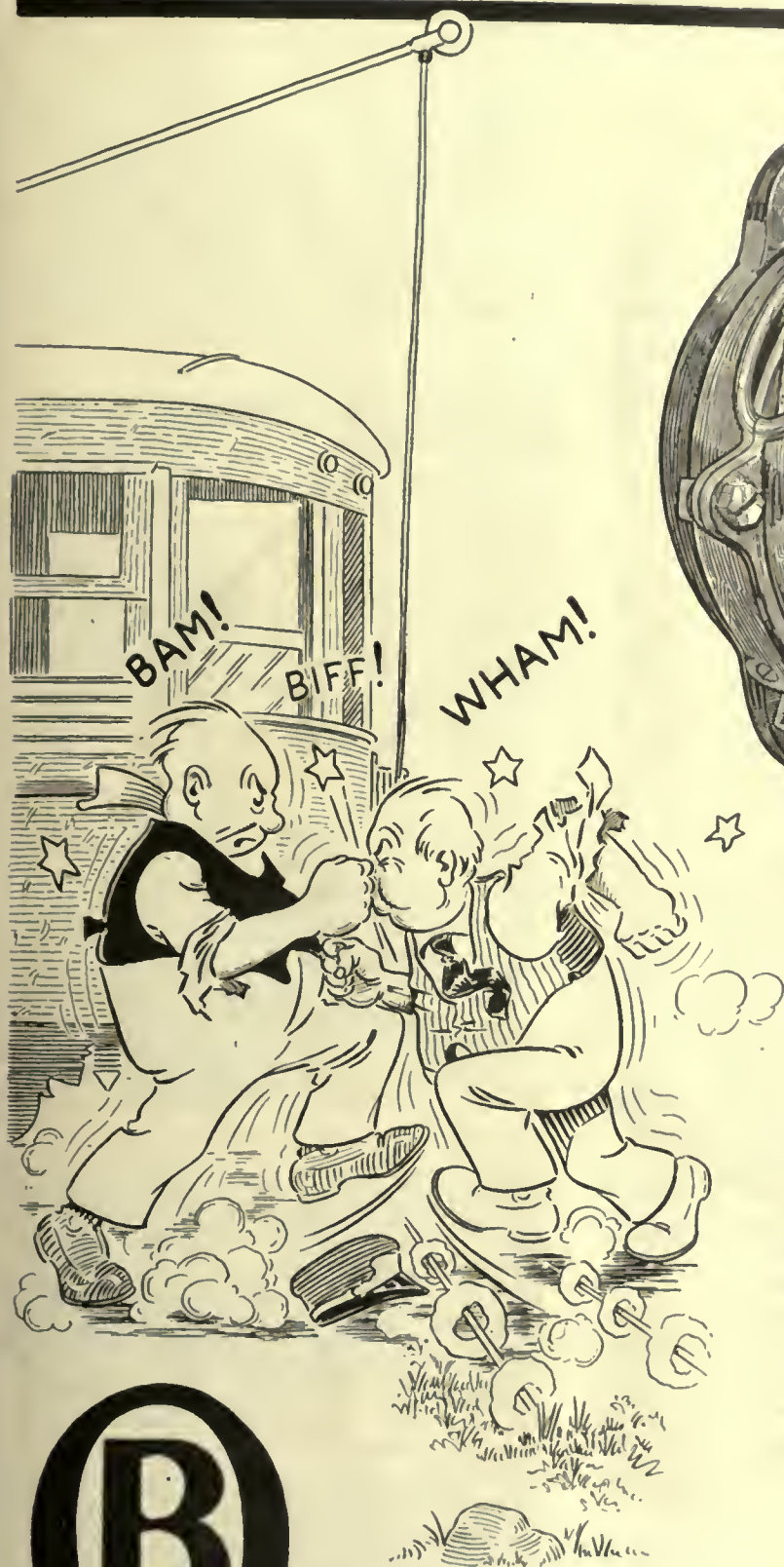
Get our new booklet No. 4474-A describing the qualities and uses of this ideal bearing material.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries



The best results from lead base babbitt are obtained when melted in the Westinghouse automatic electric melting pot. It maintains the correct pouring temperature at all times.

Westinghouse



An Actual Occurrence

A case is on record of two conductors "going to it" over the privilege of trying out an O-B Trolley Catcher. Of course, it is not the intention to start a fight on your property, but why not make a trial of the improved O-B Catcher with oil reservoir?

Your car men will like it and your shop men will have little occasion to see it.

The Ohio Brass Co.
Mansfield, Ohio

B PRODUCTS

Squeaks and rattles

Squeaks and rattles in your cars sell rides in automobiles and buses. The desire to ride on rubber is largely a desire to ride quietly—and squeakless, rattle-less trolley cars can exist only on good track.

Go to the root—keep your track in good condition. "Ajax" arc welded joints and effective grinding keep track in prime condition. Good cars stay good, old cars seem good on good track. And it pays. Pounded joints, battered cross-overs and corrugated rails ruin the track foundation, rack the rolling stock, "rile" the public.

Why be satisfied with such conditions when there's such good equipment for track maintenance?

Have a bulletin?

Have a quotation?

Railway Track-work Co.

3132-48 East Thompson Street, Philadelphia

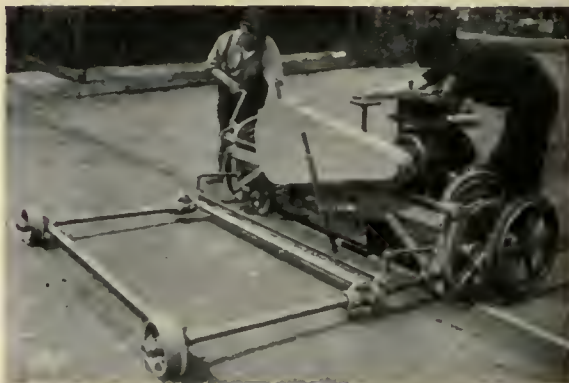
AGENTS:

Chester F. Gallor, 30 Church St., New York
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London

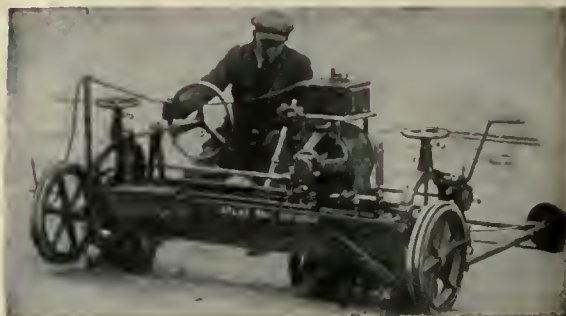
(364)



"Reelproccing" Track Grinder



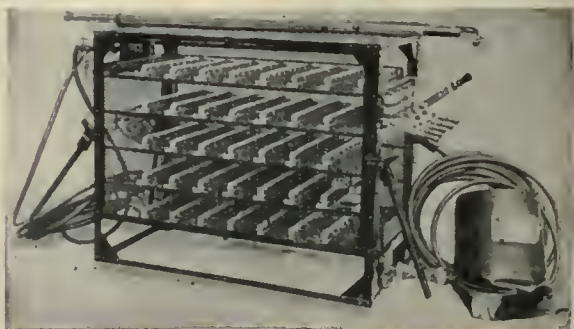
"Vulcan" Rail Joint Grinder



"Atlas" Rail Grinder



"Hercules" Swing Frame Rail Grinder



"Ajax" Electric Arc Welder



A Member of the Keystone Family

Hunter-Keystone

Readable, Visible, Serviceable Signs

EASY to install—easy to maintain! Compared with painted dash signs, and similar expedients sometimes used, Hunter-Keystone Signs are inexpensive to maintain. They keep their clean-cut appearance, and furthermore they are always visible at night.

By making it easier for the prospective passenger on the street corner to distinguish his car at a distance, you keep him as a customer instead of losing him to the taxi.

Hunter-Keystone Signs *do* sell the service.

ELECTRIC SERVICE SUPPLIES Co.

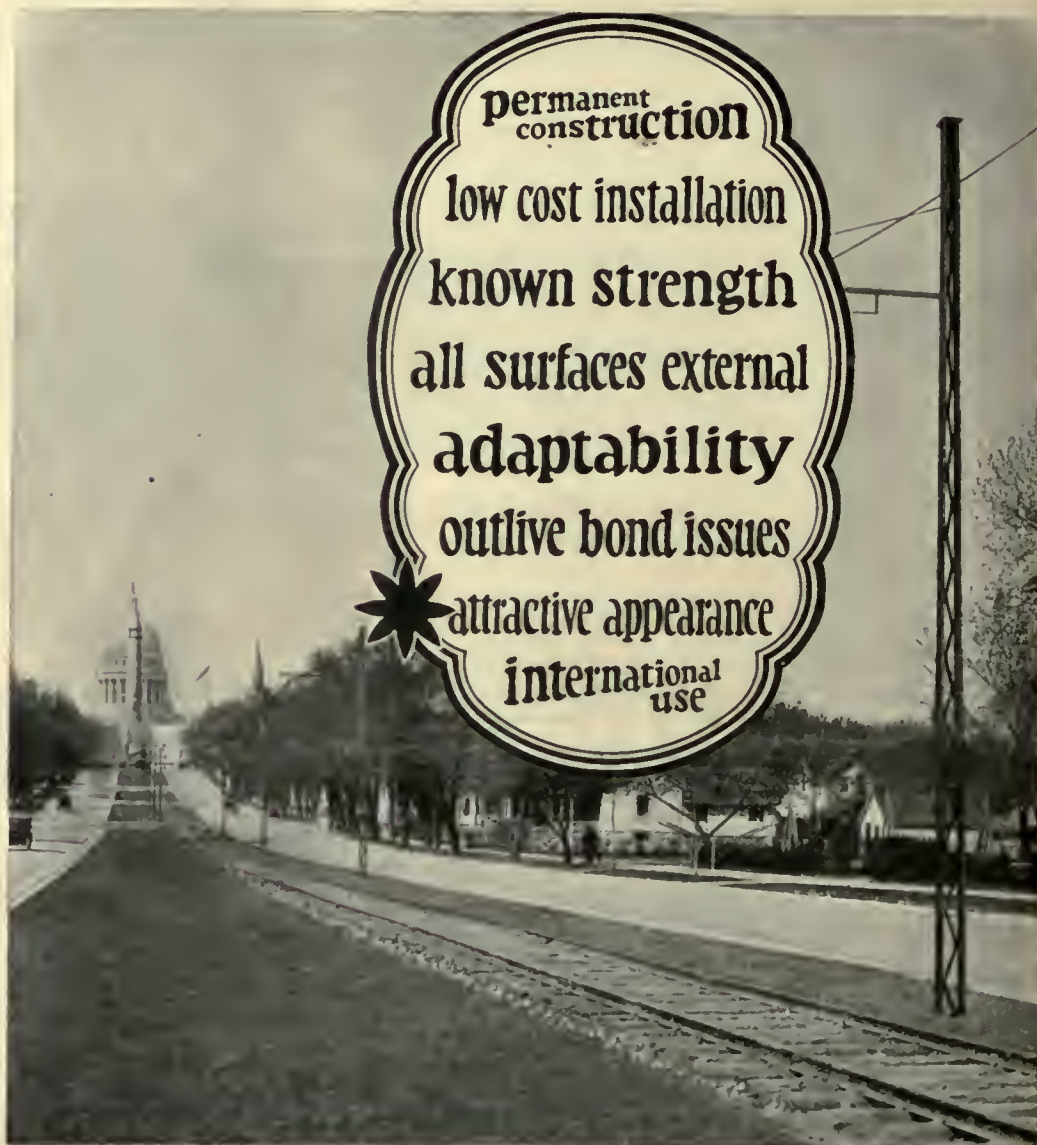
PHILADELPHIA
17th and Cambria Sts.
PITTSBURGH
829 Oliver Building

NEW YORK
50 Church St.
SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.
BOSTON
86 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver





permanent
construction

low cost installation

known strength

all surfaces external

adaptability

outlive bond issues

* attractive appearance

international
use

Attractive Appearance

The attractive and pleasing appearance of Bates poles is a decided factor in their preference for municipal use

For instance — "We have received a number of compliments from people in the districts where the poles are in use as to the beauty of their appearance on the street, and have had requests from several other districts to rebuild their line with this kind of construction."

The rugged simplicity of Bates poles makes them particularly appropriate for use where public demand for beauty is a factor. Bates engineers will be glad to figure at your request on your requirements.

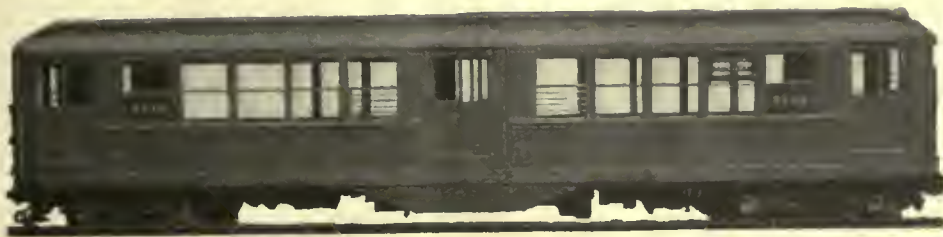
B E S T Bates Expanded Steel Truss Co.

Illinois Merchants Bank Bldg.

Chicago, Ill., U. S. A.

BATES ONE PIECE EXPANDED STEEL POLES

"SERVICE TO THOSE WHO IN TURN RENDER SERVICE TO THE PEOPLE."—*Roxentree*



As determined by the records of the Interborough Rapid Transit Company of New York, NP Doors are *five times as safe* as the manually operated doors previously employed. Their use not only reduces accidents, increases speed and economy in operation, but is a fact of real public interest which is advertised by the Interborough in order to increase the appreciation and confidence of passengers.

The National Pneumatic Company designs and produces complete equipment for the safest and most economical operation of doors and steps on every type of public conveyance.

NATIONAL PNEUMATIC COMPANY

Executive Office

50 Church Street, New York

General Works

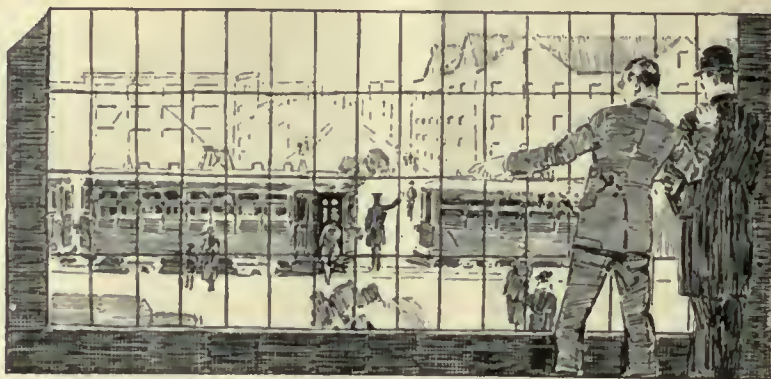
Rahway, New Jersey

CHICAGO
McCormick Building

MANUFACTURER IN
TORONTO, CANADA
Dominion Wheel & Foundries, Ltd.

PHILADELPHIA
Colonial Trust Building

Save Power with Lightweight **SAFETY CARS**



**“The Economy extends
even to the Power House!”**



SAFETY CAR DEVICES CO.

OF ST. LOUIS, MO.

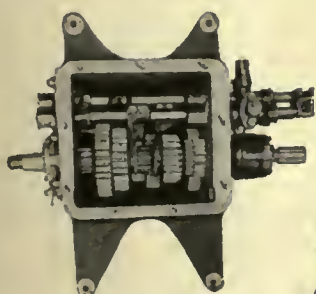
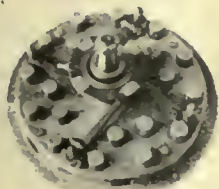
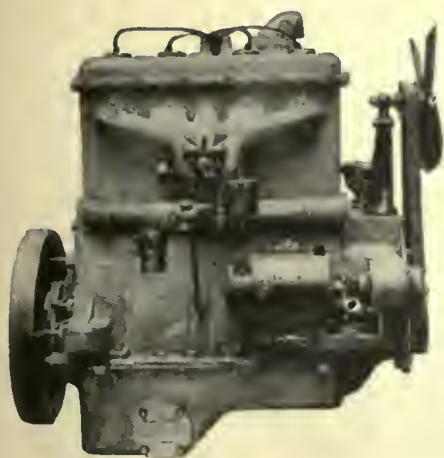
Postal and Telegraphic Address:

WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

From radiator to rear end—

a unitary assembly of
standardized parts



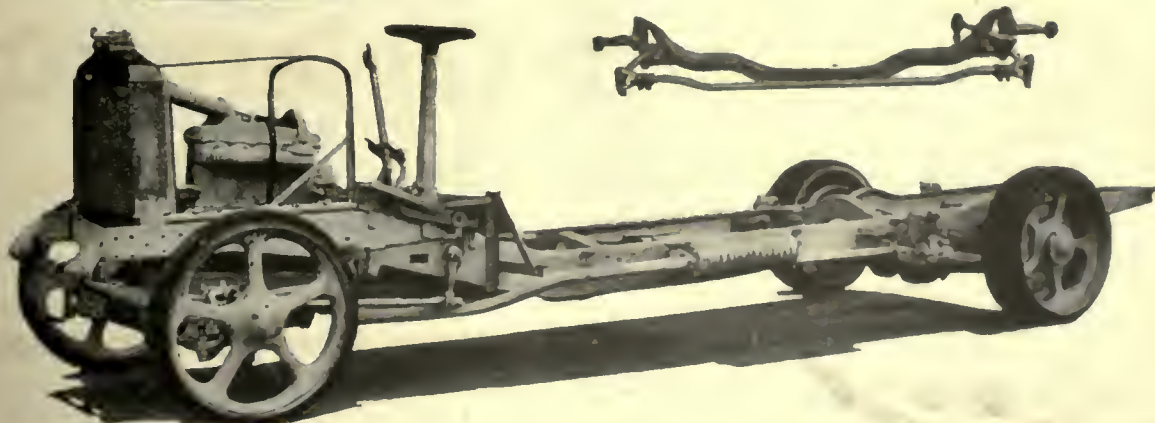
FIFTH AVENUE BUSES fit railway requirements

DEMONSTRATED operating success in New York, and a dozen other prominent cities, is backed up by *demonstrated* maintenance economy and the long, useful life of Fifth Avenue Double-Deckers.

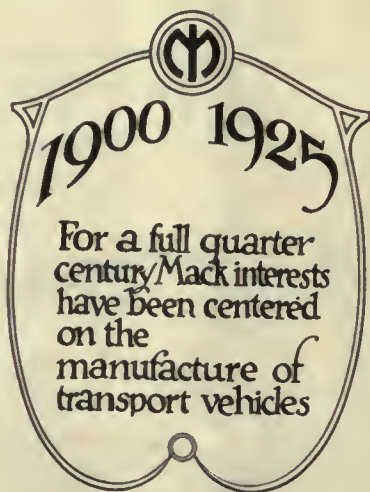
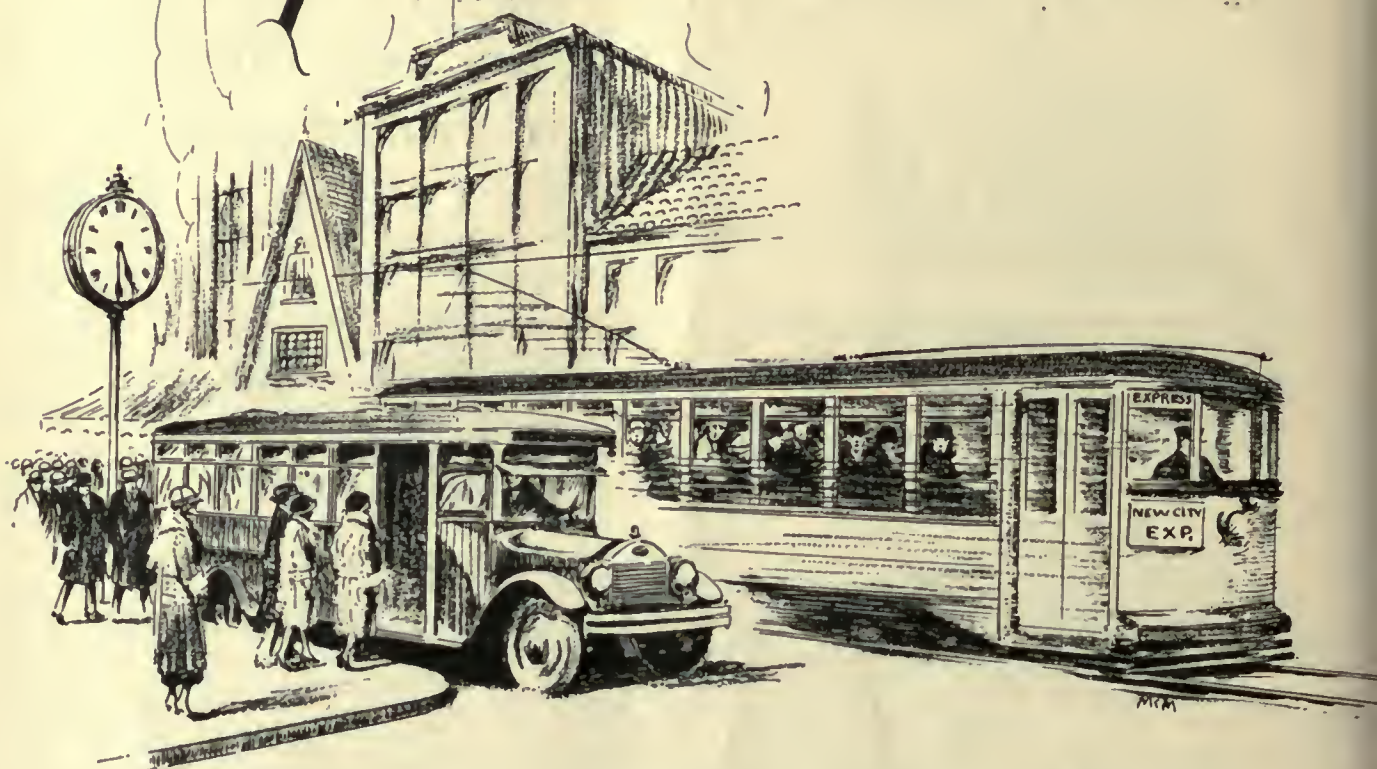
Unitary assembly means interchangeable unit parts! This simplifies maintenance, reduces costs, and keeps the equipment on the road in revenue-producing service virtually all the time.

Large seating capacity, low operating cost, simplified maintenance, standardized parts, long life— these are the high points for railway managements' consideration.

NEW YORK TRANSPORTATION CO.
New York, N.Y.



For parallel express



and local service— on the same street!

At least one progressive city has solved an acute transportation problem, on its main electric railway artery, by putting the street cars on an express schedule and using buses for local service on the same route.

This plan has proved eminently successful and opens up wide possibilities for further co-ordination of bus and street railway service,—where city dwellers need quick transportation to and from work in outlying factory districts, where suburban dwellers must get to and from their business offices by street car, where amusement parks or games draw crowds which must make a more or less lengthy trip.

The combining of car and bus service in this manner has proved a distinct "booster" of actual carfare receipts.

The steady, dependable and economical Mack takes first place when it comes to a choice of buses. For the Mack Bus is essentially a

sturdy, practical, comfortable vehicle, ideally fitted for such strenuous service on a fixed daily schedule.

The Mack Bus is all bus from bumper to tail light!

It shows in the good Mack Engine.

It shows in Mack Shock Insulator Suspension.

It shows in the long wheelbase and wide front axle; in the dual reduction "all bus" rear axle designed to give "straight-line" transmission with ample under body and ground clearance.

Through and through the Mack is a railway-man's bus,—his strongest ally

MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY

25 BROADWAY

NEW YORK CITY

Eighty-three direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

The Mack Bus



Sedan Type Bus

Performance counts!



More Variable Load Brakes for Brooklyn

The Westinghouse Variable Load Brake has now been in service on cars of the Brooklyn City Railroad Company for more than a year.

The Westinghouse Variable Load Brake solves the problem of controlling cars under widely varying load conditions. It automatically adjusts the brake cylinder pressure to suit the weight on the car, insuring uniform stopping distances whether the car is light or loaded.

So well has this device performed its intended function of speeding up schedules and increasing traffic possibilities, that it is to be used on the 335 new light-weight cars of the one-man, two-man type, soon to be put into service.

This makes a total of 535 Variable Load Brakes used by the Brooklyn City Railroad Company.



Westinghouse Traction Brake Co.
General Office and Works: Wilmerding, Pa.

WESTINGHOUSE TRACTION BRAKES



ELRECO Combination Railway and Lighting Poles on the Hopple Street Viaduct, Cincinnati, O.
Over 27,000 ELRECO Poles are in use in this city

One Set of Poles Takes Care of Light and Traction

Here you have a good illustration of the economy of ELRECO Combination Railway and Lighting Poles. As can be seen, they are doing double duty—supporting the trolley span wires and lighting brackets. They can also be utilized for carrying high tension and secondary wires.

This plan has been used to advantage in many cities. For the street railway company it saves half the investment in span-wire poles, since the lighting company shares the use of these poles with the traction company.

Tubular steel poles are the strongest made and are capable of sustaining strains in any direction. Especially valuable at corners where pull-offs tie in at various angles. Easiest to paint. Cheapest to maintain. Our wire lock swedge joint prevents telescoping. Chamfered joints prevent corrosion.

An investigation of ELRECO Poles will clearly demonstrate that they are the only poles a street railway company should consider.

The Electric Railway Equipment Co.


Cincinnati, Ohio

New York Office: 30 Church Street

ELRECO

POLES





International

The House of Quality and Service



International Products Also Include

Creosoted Poles
Creosoted Piling
Creosoted Lumber
Creosoted Timber
Creosoted Switch Ties
Creosoted Mine Timber
Creosoted Barge Sheathing

*A half century of experience
in timber preservation
is at your service.*

Let Choice Not Chance

Govern Your Tie Purchases

If you postpone your tie purchases until the last minute:

If you delay until springtime when the demand for ties is at its height:

If you wait until active competition in the woods puts prices up and quality down:

If you do these things you are taking a chance. But—

If you **contract now** and let **International** choose your ties, you not only save time and expense in securing them, but you receive the best assurance of tie quality.

Every **International** tie is sound, full size, carefully graded, and produced far in advance of use to receive proper air seasoning. Our insurance of quality is driven into every tie in the form of our **International Dating Nail**.

DON'T WAIT—*International is ready and at your service*

International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas



Baltimore & Ohio R. R.

Staten Island Electrification



ECONOMY METERS

with car inspection dials....



*Economy Meter with Power Saving
and Car Inspection Dials*

ALL of the Motor Cars of the Multiple Unit Equipment being built for the Staten Island Electrification of the B. & O. R. R. Co. will be equipped with Economy Meters with Car Inspection Dials.

The Meters are to be used for the two-fold purpose of power saving and as a means of scientifically determining the equipment inspection intervals.

Economy Meters are now standard on more than 200 Properties. This simple, rugged, energy-measuring device has induced savings, from coast to coast, on both large and small properties, of from $\frac{1}{3}$ to $\frac{1}{2}$ a cent per car-mile.

From a transportation standpoint, from a record-keeping standpoint, from a "safety-first" standpoint and from a mechanical standpoint the Economy Meter, with car-inspection dials is the most efficient, simple, adaptable and profitable device of its kind. Let us quote you prices and answer detailed questions. Ask about our deferred payment plan.

Let us quote you prices and answer detailed questions.

Economy Electric Devices Company

L. E. Gould, President

Sangamo Economy Railway Meters
The Air Rectifier

Peter Smith Heaters
Woods Fare Boxes

{ General Sales Agents }

{ District Agents for }

The Aluminum Field Coils
Economy Track Greaser

Bemis Boyerized Truck Specialties
Miller Trolley Shoes

1592 Old Colony Building, Chicago



Human Reasons Behind Garford Excellence

In the mind of the man who really knows commercial cars, Garford Trucks and Coaches occupy a decidedly distinctive place. They have been put there by a definite creative policy pursued consistently for twenty-two years.

We have compiled into an attractive book some interesting and illuminating stories about the men in whose hands rest the administration and development of this policy. Reading this book will give you a better understanding than you've ever had

before of the reasons behind Garford solidity and permanency.

And you will realize better why it is that users who own, and dealers who handle, Garford Trucks and Coaches evince but little interest when someone talks about other similar vehicles at a lower first cost

This advertisement is printed as a cordial invitation for you to ask us—on your business stationery, please—for our book, "Behind the Garford." You'll find it well worth while.

Busses
15 to 35
Passengers

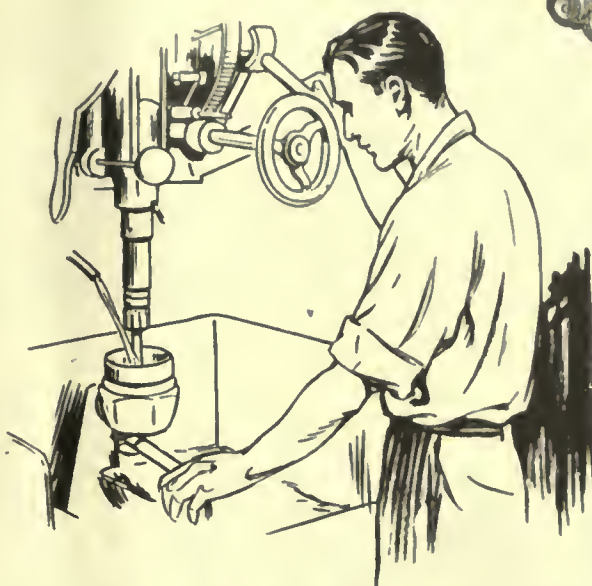
GARFORD

Trucks
1 to 7½
Tons

Beginning in 1902, Garford is now among the eight companies manufacturing 75% of the bona-fide trucks

THE GARFORD MOTOR TRUCK COMPANY, LIMA, OHIO

BUILDING TODAY FOR TOMORROW'S REQUIREMENTS



Galena Tapping and Reaming Compound

*For Improving Tool Efficiency
and Lengthening Tool Life*

MANY a tap or reamer cuts slowly or poorly for lack of proper lubrication.

Following its practice of fitting the lubricant to the work, Galena has developed a special Tapping and Reaming Compound.

Its effectiveness is shown by the following quotation:

"A test of Galena Tapping and

Reaming Compound in competition with products of other manufacturers showed 920 bolts tapped with Galena, while the nearest competitor tapped 525, using the same quantity of compound.

So you may convince yourself of the aid of this Galena product in speeding tapping and reaming work, we will gladly ship a free sample upon request.



Galena-Signal Oil Company

New York

Franklin, Pa.

Chicago

and offices in principal cities





Several pages of this data in your G-E Catalog are provided to help you select the proper brush for your motors

“and nothing but the best would do”

G-E Brushes are founded upon the experience gained in observing the operation of millions of G-E Motors, thousands built for railway service every year.

The success of G-E Railway Motors themselves is evidence of the high standard reached and maintained in G-E Brushes. In fact, the Brushes were developed for the Motors, for *nothing but the best would do*.

By calling upon G-E Brush Specialists you can be sure of proper brush application. And by keeping your G-E Railway Motors equipped with G-E Brushes your “Original Equipment Quality” is maintained.

Your Text Book on Equipment Standards



General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

GENERAL ELECTRIC

New York, Saturday, January 17, 1925

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HARRY L. BROWN, Editor

Volume 65
Number 3

Repair Shops Are the Heart of Any Transit System

THE importance of adequate facilities for repairing rolling stock was brought out forcibly in the testimony given by several officials of the operating railway companies in New York City and by the chairman of the Transit Commission while testifying in the transit inquiry just concluded there. Under the dual contracts between the city and the companies, the responsibility for providing shops for the rapid transit lines in New York devolves on the city, so that as the hearing progressed, the size, character and extent of the shops now in use by the companies soon became one of the most important questions to be determined by the testimony. The position of the commission and companies was that additional cars, even if provided, could not be kept in service without additional shops, and that delays and accidents are bound to occur more frequently if adequate repair facilities are not available. The contention of the Mayor was that the present shops were not being used to their full capacity.

It is a striking fact, in this connection, that there was general acceptance by all concerned of the principle that good shop facilities are essential to good service. The truth is that the repair shop is the heart of any electric railway system. The track and overhead construction of an electric railway may be compared to the veins and arteries of the human system, and the rolling stock to the blood that is kept circulating. Just as the blood must be brought back to the heart for purification and recirculation, so the cars must be brought into the repair shop for attention, or they will soon be unable to operate.

Even if neglect to provide necessary shop facilities is not carried so far as to stop service, it is poor economy for any company to try to get along with facilities which are inadequate. It is easily possible that a delay on the line due to improper inspection or neglected repair to a car may cause far more loss in fares than would pay for the repair or inspection of that car several times over.

Most railway executives realize the need for good shops, but when appropriations for new tools or increased facilities are being considered there is often the tendency to think the existing facilities are good enough for the present. The situation then arises that additions are made to rolling stock repeatedly without making corresponding provision for shops and storage facilities.

Where this is the case, master mechanics should take the responsibility of bringing to the attention of the management the need and value of increased shop

facilities. This they can best do by keeping records to show the savings obtained from new tools and equipment installed in their shops or from increased facilities provided, and then presenting these figures to the management at the appropriate time.

Brooklyn City Issue Quickly Taken

"WAY oversubscribed within an hour." This is the record that was written last Tuesday after the offering made that day of \$3,750,000 equipment trust certificates of the Brooklyn City Railroad at the new low rate of 5 per cent. From the standpoint of the bankers the sale was a great success. From the standpoint of the railway and the industry the offering was even more of a success. The Brooklyn offering is by 25 per cent the largest of its kind of which there is record in recent annals of electric railway financing. Moreover, the price at which the issue was placed, returning a yield of only 4.50 per cent to 5.50 per cent, is the best that has been obtained for a long while.

In the steam railroad field equipment issues are regarded as choice securities. The success of the Brooklyn City issue reflects the willingness of the investing public to accord well secured electric railway issues a similar standing. This is all the more notable because electric railway equipment does not lend itself to the same ready interchangeability that steam railroad equipment does. In the past this consideration has imposed a differential between the two forms of security decidedly in favor of the steam railroads.

Participating investment bankers report that they experienced no difficulty at all in disposing of these certificates to private investors. The bulk of the sales was made to insurance companies to be held by them until maturity. This is especially significant, as they are usually considered very conservative. Incidentally the offering shows the growing tendency among the electric railways to take advantage of the aid which the equipment trust affords them to modernize and merchandise. The total of issues of over \$200,000 so placed last year was \$9,229,600.

So far as this latest issue is concerned there is nothing burdensome in the terms of the indenture under which the securities are issued. The maximum annual "dividend" requirement on the certificates is only \$187,500, and the maturities are \$375,000 annually over ten years, a period well within the reasonable life of the equip-

This is the issue in January that is devoted essentially to maintenance subjects

ment on which the certificates are secured. The maximum charge in any year will thus be \$562,500. For the year 1924 the company had available a balance of \$2,001,720 after the payment of operating expenses, fixed charges, taxes and rentals. The cash payment required was only slightly more than 25 per cent of the estimated cost of the equipment. Incidentally, for those who are given to reading between the lines, the successful placing of an issue of this kind on such favorable terms is a silent but substantial tribute to a management that has not hesitated to put earnings back into the property to the great benefit of the security holders. Every move of this kind by the Brooklyn City has resulted in added economies in operation, and the new equipment, designed in accordance with good, modern practice, may confidently be expected to do more than pay its way from the start. As indicated previously, the success which has attended the placing of this issue is a distinct achievement for the issuing company and it will react to the benefit of the industry.

Bond Maintenance Is Important to Minimize Return Circuit Resistance

BURIED beneath the paving and frequently neglected, the rail bond is one of the important elements in the electric circuit of the railway system. The outgoing distribution system is checked up carefully, as it can be seen, resistance measurements are not difficult and it can be repaired readily. The track circuit, on the other hand, is frequently neglected, as it is hard to check up and hard to get at for repair. Yet, it is good economy to maintain the return circuit well.

The survey on bond testing and maintenance practice published in this issue points out some of the difficulties experienced with rail bonds and the methods of testing and locating defective bonds for repair. In general, the types of bonds with a welded or brazed contact between rail and copper show up the best in service, as there is comparatively little deterioration until failure comes from a complete break of the connection. This makes the detection of defective bonds considerably easier than with the compressed terminal type, which deteriorate gradually and progressively due to corrosion. But repair of the compressed terminal type of bond is easier than for any of the welded types, as it does not require transporting a welding outfit about the property. However, the work done by the ordinary repair crew in replacing compressed terminal bonds is usually not so good as the repair work on welded bonds.

From an electrical point of view, no method of joining the rails can be superior to a continuous rail section without breaks. This can be approximated by the various types of welded rail joints, which not only do not deteriorate, but have a conductivity equal to that of continuous rail or nearly so. While high conductivity can be obtained through bonded joints, it is ordinarily too expensive to put on a sufficiently large area of copper bonds to get as low a resistance as that of solid rail. While the use of welded joints is to be desired by the electrical engineer, there are many places where welded track joints are not desirable, so that there probably always will be many miles of track with bolted joints. Rail bonds are the only available means of insuring good electrical contact on such joints.

The Annual

Legacy of Laws

FORTY-TWO legislatures meet this year. Some of them are already in session. Messages from the governors to these bodies are being combed by the editorial writers for evidences of a desire on the part of the newly elected executives to include suggestions to the legislative solons that reflect the party platforms. As in the past, there will be much disappointment and despair.

Not so much because it is New York, but because it is one of the first to come to hand in full and one of the most far-reaching in its significance, is the message of Governor Smith of New York of interest. His stand on home rule and his willingness to play Mayor Hylan's game in part at least are well known, but the people of New York were hardly prepared for the shock which Governor Smith had in store for them. The great bulk of the thinking people of the state are still staggering from the blow he has dealt them. He is for home rule and municipal ownership. There appears to be very slim prospect that his public utility program can be put through. A certain sense of security is to be found in that, but the matter does not end there. There are plausible, very plausible arguments for home rule. Mr. Smith makes the best of them, but in the end home rule is distinctly not in the best interests of the community. In the case of New York City it would undoubtedly be fatal. Yet Governor Smith is for it. He's for it on a wider scale than ever before. He defends openly the municipal operation of bus lines and by implication the municipal operation of subways.

But Governor Smith is not the only one who is sounding the home rule cymbals. The same thing is being done out in Ohio. And, strangely enough, the situation there has two anomalies, both arising out of a controversy in Cleveland. First, it apparently was expected that the state commission would grant a certificate of convenience and necessity to a bus service there that would be in serious competition with the Cleveland Railway. Granting of a certificate under such circumstances would be quite contrary to the principle accepted and followed by nearly all commissions. The other anomaly is that the Cleveland Railway is father to an amendment to a state law which would take from the state commission the authority to grant rights to any bus company within the limits of any large city. In other words, this is going back to home rule, whereas the principle accepted and urged by the national utility and bankers' associations and adopted by nearly all of the state legislatures is that of state as against municipal regulation. It seems unfortunate that this tendency exists in Ohio to resort to measures which are out of line with the accepted view on the part of both the commission and the railway. The position of the railway seems to have been taken as a defensive step against the likelihood of an unwarranted and ill-advised act by the commission.

It appears likely now that bus regulatory legislation will be passed this winter in both Indiana and Missouri, thus bringing these states more nearly in line with others on this matter. Moreover, there is need for strengthening some of the present laws governing bus and truck as common carriers. It will be several months before the oratory subsides sufficiently to permit calm calculation of the results.

Bond Testing and Maintenance Practice

Types of Bonds Employed, Causes of Failure, Methods of Testing and Replacement Standards Are Summarized for 25 Electric Railways — While Welded Joints Eliminate Need for Bonds, There Are Occasional Failures, so that Checking of the Return Circuit Is Desirable

EVEN with the large increase in the use of welded rail joints there still are many thousands of mechanical joints in use in this country which require the connection of rail bonds to complete the electric circuit with a reasonably low resistance. In order to determine the trend of current practice in bonding and in bond testing, this paper has conducted a survey of large, medium and small electric railway properties that use rail bonds. It was found that while there is a decided trend toward the various types of welded bonds the compressed terminal type of bond is used very largely on the roads included in the survey. Methods of testing have changed but little in recent years. The method of obtaining potential drop across the bond in millivolts compared with the drop across a fixed length of rail is the one in most common use. Out of the 25 properties included in the survey there are but two that use the bond testing car, although several are in use on other properties.

The table included with this article gives the approximate number of bonds in use by the various companies, with the exception of several roads that have incomplete records. Of the number of bonds as stated by the roads giving this information, there were approximately 400,000 compressed terminal bonds, 80,000 brazed bonds, 250,000 arc-welded bonds and 110,000 gas-welded bonds, making a total of 840,000. Thus the compressed terminal bonds represent 48 per cent of those listed.

About 45 per cent of the bonds are of the unprotected type, the greater number of them being attached to the ball of the rail. In general the welded types are more likely to be exposed than the compressed terminal type. The method in most general use for protection is to place the bonds under the joint plates. The only companies stating that they protect their bonds by placing them under the base of the rail are the Northern Ohio

Traction & Light Company, the Eastern Massachusetts Street Railway, the Detroit Department of Street Railways, the Rockford & Interurban Railway and the Bangor Railway & Electric Company. The latter two companies also use bonds placed under the joint plates.

CAUSES OF FAILURE OF BONDS

The causes of failure vary considerably with the type of bond. In all cases, however, loose mechanical joints are mentioned as one of the chief reasons for failure. With bonds of the compressed terminal type the most important cause given is corrosion, according to nine companies. Loosening of the pins and terminals is given by four companies, and improper application of the bonds by three. Other causes mentioned are splitting of the rail web at the bonding holes, breakage of the strands of the copper, vibration, and burning of the terminals. Breakage of strands is the principal cause for failure of brazed bonds, five companies giving this reason. Failure of the brazing is given by two companies as the chief cause of failure, and vibration by two others. One company states that wheels of automotive vehicles shear off the bonds.

Apart from loose mechanical joints, the shearing off of the bonds by vehicle wheels is the principal cause of failure of both arc-welded and gas-welded bonds, according to ten companies. Other causes for the failure of arc-welded bonds are breakage of strands, improper application, poor welding and air pockets in the weld, and breakage of the rails themselves. Miscellaneous causes for failure of gas-welded bonds are vibration, poor welding and air pockets in the weld.

FEW FAILURES OF WELDED TRACK JOINTS

Welded track joints give little trouble from the standpoint of the return circuit. Breakage of the joints is the principal reason for failure of conductivity.

TYPES OF RAIL BONDS IN USE ON 25 ELECTRIC RAILWAYS

Company	Number of Bonds			Number of Bonds		Per Cent Replaced Annually
	Comp. Term.	Brazed	Arc Weld	Exposed	Protected	
Los Angeles Railway Corporation, Los Angeles, Cal., per cent...				3	93	1 2
Market Street Railway, San Francisco, Cal.	64,700	4,630	0	12,790	56,370	3
Denver Tramway, Denver, Col.	0	5,000	25,000	0	30,000	3
Connecticut Company, New Haven, Conn.	163,000	25,000	12,000	0	27,000	Under 3
Georgia Railway & Power Company, Atlanta, Ga.	20,000	0	12,200	9,800	20,000	4
Aurora, Elgin & Fox River Electric Company, Ill.	100	0	100	0	100	7
East St. Louis & Suburban Railway, East St. Louis Railway, Alton, Granite & St. Louis Traction Company, East St. Louis, Ill.	11,750	0	10,750	0	10,750	2
Rockford & Interurban Railway, Rockford, Ill.	1,000	29,100	4,000	2,500	29,600	20
Bangor Railway & Electric Company, Bangor, Me.						
Boston Elevated Railway, Boston, Mass.	32,000	0	46,000	0	33,000	7
Eastern Massachusetts Street Railway, Boston, Mass.			38,316	0	18,027	0
Department of Street Railways, Detroit, Mich.		0	0	0	0	3
Saginaw Transit Company, Saginaw, Mich.	20,120	2,000	0	18,032	13,760	10
Omaha & Council Bluffs Street Railway, Omaha, Neb.	8,392	10,000	48,000	20,000	69,344	17
Northern Ohio Traction & Light Company, Akron, Ohio.						
Pennsylvania-Ohio Power & Light Company and Pennsylvania-Ohio Electric Company, Youngstown, Ohio.	12,433	0	32,350	750	39,900	3
Charleston Consolidated Railway & Lighting Company, Charleston, S. C.	6,000	0	3,000	0	2,000	14
Dallas Railway, Dallas, Tex.	0	0	10,000	0	10,000	0
San Antonio Public Service Company, San Antonio, Tex.	3,000	4,000	0	10,000	14,000	0
Utah Light & Traction Company, Salt Lake City, Utah.	29,000	0	0	1,500	1,000	5
Newport News & Hampton Railway, Gas & Electric Company, Newport News, Va.						
Virginia Railway & Power Company, Richmond, Va.	14,000 total	all types	0	0	3,000	3
Seattle Municipal Railway, Seattle, Wash.	5,000	0	400	0	400	4
Ohio Valley Electric Railway, Huntington, W. Va.	0	0	48,600	18,500	30,100	2
Eastern Wisconsin Electric Company, Oshkosh, Wis., per cent	60	30	10	0	60	20

Such failures are infrequent as compared with failures of bonds. The Connecticut Company had a large number of failures of rail welds a few years ago, when it was the practice of the company to weld light rail, but few failures have occurred with heavy rail. On old track the Georgia Railway & Power Company has had as many as 18 per cent of failures of welded joints, but it has had less than 1 per cent on new track. In the period 1921-1923 the Eastern Massachusetts Street Railway had 974 failures out of a total of 89,969 welded track joints. With 347.5 miles of track welded this is 2.8 per mile of single track for the 3 years. The Department of Street Railways, Detroit, has had cracks develop in the upper seams of four joints in new track and 75 joints in old track repaired by the arc-welding process. These cracks were due to lack of proper support of the joints.

The Omaha & Council Bluffs Street Railway has had about 200 failures of welded track joints, or 15 per mile of track that has been welded. On the lines of the Pennsylvania-Ohio Power & Light Company, which uses thermit welds, there have been 12 failures out of 2,930 joints over a period of 8 years, or 0.774 joint per mile of single track. The San Antonio Public Service Company has had failures of 2 per cent of its welded joints. Sixty joints, or 10 per single-track mile, is the record of failures of welded joints on the Utah Light & Traction Company's property. Some failures have occurred on the track of the Newport News & Hampton Railway, Gas & Electric Company where old plates were welded to old rail. However, there have been no failures where the work was done on new track in the original job. Approximately 0.1 per cent of the welded joints have failed on the Virginia Railway & Power Company's track. The Eastern Wisconsin Electric Company has had no failures of welded joints in 2 years.

METHODS USED FOR BOND TESTING

The type of instrument used most widely for bond testing is the Roller-Smith direct-reading bond tester. This device is used with current flowing through the rail from normal car operation and indicates the resistance of the bond in equivalent feet of solid rail. Other types of bond testers used are the standard Weston millivoltmeter, the American Steel & Wire Company's bond tester and the Electric Service Supply Company's No. 34,175 tester. While the small companies ordinarily use but one instrument each, several roads have two and the Eastern Massachusetts Street Railway uses eight Roller-Smith instruments. In Omaha a preliminary check is made of potential drop in the various sections by using telephone pairs as leads and obtaining voltmeter readings. These readings are taken for 24 hours. If this check shows a poor section an individual test is made. On some of the Eastern Massachusetts Street Railway's long country lines with infrequent car service it is necessary to feed current through the rail by means of heater coils used as a loading resistance so as to get a sufficient deflection of the instrument. A somewhat similar device made of resistor grids is used by the Virginia Railway & Power Company to get enough current in the rail. The practice on the Seattle Municipal Railway is for the bond tester to carry in his pocket a flashlight cell. This is connected with the instrument leads so as to furnish current across joints to be tested where there is little or no current in the

rails, such as at neutral points between substations or near the ends of lines.

Bond-testing cars of the type which was developed a number of years ago by Albert B. Herrick are in use only by the Boston Elevated Railway and the Connecticut Company among the roads replying. The Detroit Department of Street Railways is contemplating the use of such a car. This device gives a graphic record of the resistance of each bond as it is run over the track at a speed of 10 m.p.h. or more. By a check of the location it is possible to determine which bonds have failed. It was at first the practice of the Connecticut Company to refer the location of a defective bond to the nearest pole, but several cases where with more than one bond between poles the repair gang dug up the wrong bond led to a change in practice, so that the car is stopped at the defective bond and its exact location painted so there can be no misunderstanding.

MARKING DEFECTIVE BONDS

In general, two methods are used for marking bonds found defective by the meter methods. One of these is to mark the rail with paint, and the other to mark it with a chisel or a center punch. The Pennsylvania-Ohio Electric Company uses several colors of paint to indicate different test results. A few companies use a colored chalk or crayon for the purpose. Another method sometimes used is to determine the location of the defective bond from some fixed point. The Los Angeles Railway, for instance, indicates the location of the defective bonds on the report sheet by pole numbers. In Detroit the indications are given by house numbers where possible, and chisel marks are placed on the rail as additional identification. At Charlestown a count is made from the nearest special trackwork, while the Virginia Railway & Power Company numbers the bonds from the street intersections.

In Seattle the defective bonds are located with respect to the houses, poles, or other landmarks and listed on blank forms, a copy of which is illustrated with this article. This same form is used by the repair man to indicate the type of bond removed and its condition, as well as the type of bond installed in place of it.

On some roads the bonding crew follows immediately behind the bond tester. In this event, only temporary marks are needed. Railways using this practice are the Bangor Railway & Electric Company, the Eastern Massachusetts Street Railway, and the Newport News Railway, Gas & Electric Company.

PERIOD OF TESTING

Considerable difference exists in the length of time that the track is allowed to go between tests of rail bonds. A number of the companies included in the survey make tests approximately once a year. These include the Northern Ohio Traction & Light Company the Connecticut Company; the Eastern Massachusetts Street Railway; the Bangor Railway & Light Company; the Detroit Department of Street Railways; the Los Angeles Railway; the Utah Light & Traction Company; and the Aurora, Elgin & Fox River Railway. The Denver Tramway makes bond tests at periods varying from 6 to 9 months. The Seattle Municipal Railway makes tests in paved streets once a year and on unpaved tracks every 6 months. A 6 months period between tests is used by the Pennsylvania-Ohio Electric Company, the Saginaw Transit Company, the Ohio Valley Electric

Company, and the Eastern Wisconsin Electric Company. Two roads have a period of 2 years between tests. These are the Rockford & Interurban Railway and the Georgia Railway & Power Company. The remainder of the companies included state that the period of testing is irregular.

WHEN BONDS SHOULD BE REPLACED

It is noticeable that the failures of the compressed terminal bonds are progressive as the contacts between steel and copper corrode or work loose, while the failures of the welded and brazed types are more or less sudden. With the latter types, so long as several strands of the flexible portion of the bond remain intact, the resistance of the bond will ordinarily be low enough to carry the current without a drop of potential in the track so great as to cause difficulty in operating cars. This makes it easy to determine if the bonds should be replaced, as there is a wide difference in the readings of the testing instrument between good and bad bonds. With compressed terminal bonds, on the

it is stated that better workmanship which the company is now obtaining will reduce the replacement of bonds to between 5 and 10 per cent a year.

On the lines of the Market Street Railway, when a section of track is overhauled or rebuilt, the bonds are examined and put in first-class condition. Otherwise, the bonds are not investigated. The cost of opening the streets, removing the joint plates and repairing is so high that a slight deficiency in bond conductivity as shown by the testers would not receive consideration, so that the bonds are not tested.

The exposed type of brazed bonds was installed by the Connecticut Company several years ago. A large portion of the bonds have since been replaced in connection with reconstruction work, although at the present time there still are a considerable number of the brazed bonds in service. These are stated to be in as good condition as when they originally were installed. The company now uses the arc-weld exposed type of bond on maintenance work and on new construction on special work.

FORM R116 1000 7-22 TAM 4716C

MUNICIPAL STREET RAILWAY, SEATTLE

BOOK No. _____

LIST OF DEFECTIVE BONDS June 21st. 1924 PAGE 4

LOCATION WESTLAKE LINE, Con't. DATE OF REPAIR: MONTH _____ YEAR _____

TRACK	RAIL	LOCATION	R'D'G	TO BE FILLED IN BY REPAIR MAN		
				TYPE & OLD BOND	CONDITION	TYPE & NEW BOND
		<u>Westlake Avenue N.</u>				
<u>West</u>	<u>West</u>	<u>4' north of Building No. 1546</u>				
<u>East</u>	<u>East</u>	<u>1st joint south of door 1547</u>				
<u>East</u>	<u>East</u>	<u>Opposite door 1547</u>				
<u>East</u>	<u>East</u>	<u>2nd joint south of 2nd span wire pole S. of door 1717</u>				

Form Used by the Seattle Municipal Railway for Recording Bond Tests and Replacements

other hand, it becomes a matter of determining a limiting resistance which is considered low enough not to cause interference with car service.

A majority of the railways included in the survey give the testing crew tabulated or other information regarding the bonds and the permissible resistance. The equivalent resistance which is considered satisfactory differs with the companies, depending to a certain extent on the amount of traffic and the return current which must flow through the rail. A bond resistance equivalent to 4 ft. of rail is considered satisfactory by the Virginia Railway & Power Company; the Market Street Railway considers the joint all right if the resistance of 1 ft. of rail, including the joint, is not greater than 5 ft. of solid rail; while the Omaha & Council Bluffs Street Railway marks the bond for replacement if it has a resistance exceeding that of 6 ft. of equivalent rail, and the Newport News Railway, Gas & Electric Company replaces the bond if it has a resistance greater than 8 ft. of rail.

NUMBER OF BONDS REPLACED ANNUALLY

The number of bonds repaired or replaced annually varies greatly on the different properties. This is indicated in the right-hand column of the table. On new track, with protected bonds of the welded type, replacements are very few. With the older types of bonds, the replacements may run as high as 20 per cent of those installed. On the Bangor Railway & Electric Company, which has the latter figure for replacement,

Gas-weld bonds are repaired by the Omaha & Council Bluffs Street Railway when they have been removed for any cause. This is done by grinding the head and stretching the bond straight, after which it is bent to a U shape and placed in stock.

The 4,000 ribbon-type brazed bonds on the lines of the San Antonio Public Service Company have not been found satisfactory. This is due to the excess heat in the installation process weakening the ribbon adjacent to the terminals and causing the ribbon to break under the constant vibration.

THEFTS OF BONDS UNIMPORTANT

Most of the companies included in the survey state that the theft of bonds is now a matter of little or no importance, even when the exposed types are used exclusively. This is probably true in large measure to the types of bonds now in common use being shorter and having so much less copper than the old-style bonds that it does not pay a thief to remove them. Then, too, the welded types are so strongly fastened to the rail that it is quite difficult to remove them. Of the companies making definite statements as to the number of such thefts, the Northern Ohio Traction & Light Company states that 2 per cent of its bonds are stolen annually, while the Pennsylvania-Ohio Electric Company states that 1 per cent are stolen. The Georgia Railway & Power Company loses about 50 bonds a year, and the Omaha & Council Bluffs Street Railway approximately the same number.

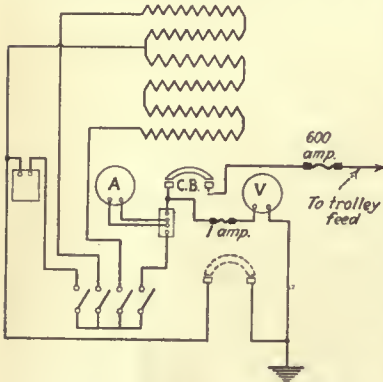
Water Rheostat Used for Testing Circuit Breakers

Close Regulation of Resistance Up to 500 Amp. Is Secured by This Means in Chelsea Shops of Eastern Massachusetts Street Railway

BY H. T. HURLOCK

Engineer Rolling Stock and Shops Eastern Massachusetts Street Railway, Boston, Mass.

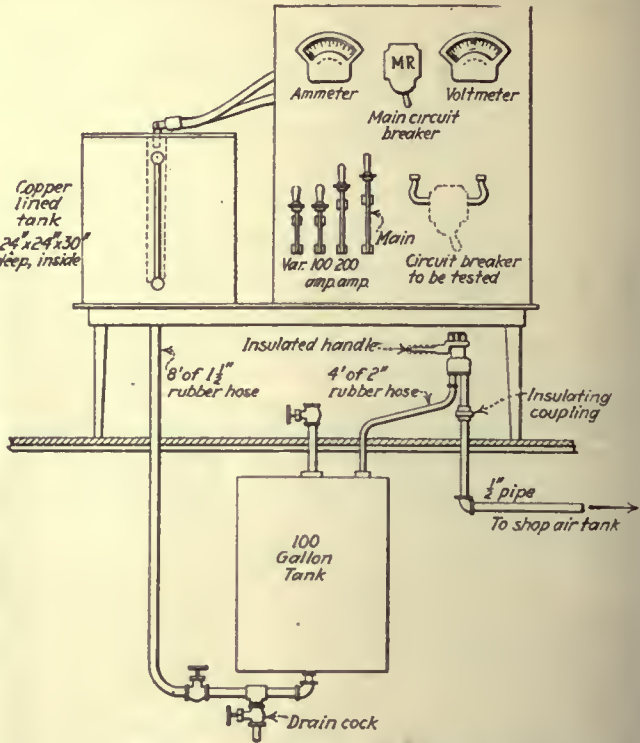
ALL circuit breakers passing through the repair department of the Chelsea shops of the Eastern Massachusetts Street Railway are carefully tested before they are returned to service. The outfit used for this work consists of a water rheostat operating in parallel with two banks of grid resistors. The water rheostat is designed with a capacity of 200 amp., while the fixed resistances are 100 and 200 amp. respectively, giving a total capacity of 500 amp.



Wiring Diagram of the Testing Apparatus

To empty the rheostat the air is released to atmosphere, and the brine flows back by gravity into the storage tank. The combination of water rheostat and fixed

A shop supply of compressed air pumps brine into the water rheostat from a storage tank located under the floor. The air, which is controlled by an engineer's valve, passes into the top of the storage tank, and thus forces the brine up into the rheostat.



Piping Arrangement Showing How the Level of the Brine in the Water Rheostat Is Controlled

resistance permits close regulation up to the full capacity of 500 amp.

The water rheostat, 24 in. x 24 in. x 30 in. deep, is constructed of wood, copper lined, and has a brine capacity of 50 gal. Two electrodes of No. 14 gage sheet iron 3 in. wide are suspended from the top of the rheostat and spaced 7 in. apart. A water gage is added to indicate the height of the brine. Both rheostat and storage tank are mounted on insulated supports, and rubber hose is used for the connections. The entire apparatus has been built from materials on the property and has given satisfactory results.

It is the practice of this company to set circuit breakers to trip at 150 per cent of the full load rating of the motors, after which the adjustment is pinned to prevent tampering by unauthorized persons. Breakers which are found to be inaccurate in service are returned to the shops for adjustment.

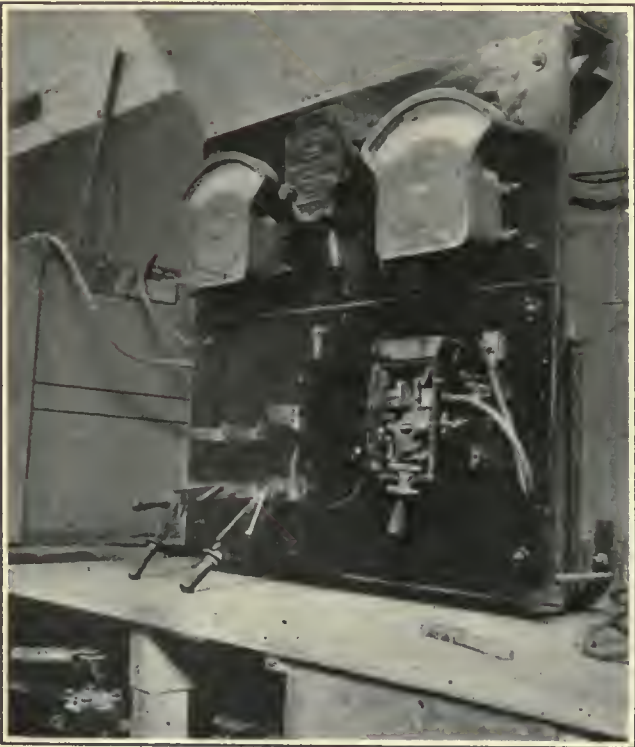
Shopman's Badge Uses Company Symbol

AN OCTAGONAL badge has been devised for the use of the shopmen of the Altoona & Logan Valley Electric Railway, Altoona, Pa. The feature of this badge is a closed belt with a buckle at the bottom and the words "Logan Valley" around the circumference.



Characteristic Symbol of the Logan Valley Line Is Used On Shopman's Badge

The symbol is the same as that long used by the company on the sides of its cars. The badges are made of metal and are manufactured by the Whitehead & Hoag Company, Newark, N. J.



Circuit Breaker Testing Panel in the Chelsea Shops of the Eastern Massachusetts Street Railway

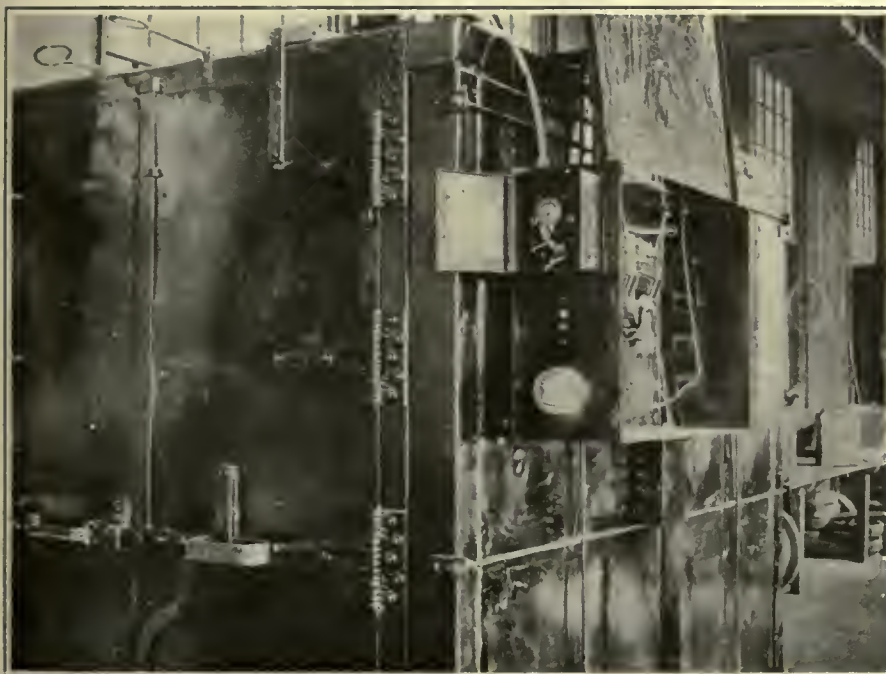
Pull-Ins Reduced 80 per Cent

By Installing Armature Dipping and Baking Facilities and by Changing the Kind of Waste Used in the Journal Boxes the Harrisburg Railways Eliminated the Cause of Many Breakdowns

DURING the past year the Harrisburg Railways, Harrisburg, Pa., has reduced the number of cars pulled in per month from 110 in January to 21 in November. The average car mileage per pull-in has been increased from 2,950 to 14,504. This improvement has resulted from three principal things. Breakdowns to cars in service have become less frequent since the practice of dipping and baking armatures has been undertaken. A change in the kind of waste used in

moves, it has been found best to use a portable track which is laid down when the doors are open and is taken up before they are closed.

The armature carriage is a box made of sheet metal welded together and placed on wheels. It was built in the welding shop of the railway. Holes have been bored through the top and bottom to take the armature shafts. By this arrangement the armatures are held securely in place. A chain hoist by which armatures are raised



The Baking Oven Shown at the Left Has Been Installed in an Accessible and Well-Lighted Location. The Dipping Vat Shown at the Right Is Made of a Steel Oil Drum. Note the Portable Track Standing Against the Wall

packing journal boxes has reduced the number of hot bearings. A repair man is kept downtown at the square all day to make minor repairs and thereby save having to take cars out of service.

Dipping and baking apparatus was installed in the armature room in April of this year. This location is particularly good because the room has a southern exposure and many large windows, making it sunny and bright. Moreover, it is readily accessible. A dipping vat has been made from a steel oil drum, which has been sunk below the floor. The position of the cylinder is vertical, with the top flush with the floor. Armatures are suspended vertically and lowered by a chain hoist into the liquid.

The electric baking oven, which was built by the Despatch Manufacturing Company, Minneapolis, Minn., is only a few feet away from the dipping tank and facing it. Its general appearance is shown in an accompanying illustration. After having been dipped, the armatures are placed on a carriage and rolled into the oven. Because the oven doors close tightly, with no opening in them for the rails on which this carriage

from the dipping vat moves along a short track so that the armatures can be lowered directly onto the carriage. An important point in connection with the handling of armatures is the use of a copper lining band inside of the grips which are placed on the armature shaft. The use of this lining has proved efficacious in preventing damage to the metal of the shaft.

AUTOMATIC TEMPERATURE CONTROL HAS BEEN PROVIDED FOR THE BAKING OVEN

The baking oven has the usual thermostatic control and also a time control. The temperature range of the thermostat is about 2 deg. Field coils are baked at 220 deg. F. and armatures at 250 deg. F. A cut-out has been arranged so that when the doors are open the circuit is broken. The time control has been provided so that armatures or field coils can be left in the baking oven over Sundays or holidays when the armature repair man will not be on hand to turn off the current. This is so arranged that after a fixed temperature has been maintained for a certain length of time the clockwork mechanism automatically opens the circuit.

The installation of the dipping and baking apparatus is considered by the railway to have been instrumental in reducing the number of pull-ins. The monthly record shows how the average mileage per pull-in began to increase to a marked extent soon after dipping and baking was undertaken. Monthly figures are given in the accompanying table. December, it will be seen, was not quite so good as November, but in spite of adverse weather conditions was far better than the early months of the year.

PULL-IN RECORD OF HARRISBURG RAILWAYS FOR 1924		
Month, 1924	Total Pull-Ins	Car-Miles per Pull-In
January	110	2,950
February	110	2,770
March	93	3,302
April	*70	*4,536
May	62	5,376
June	78	4,055
July	46	6,950
August	55	5,714
September	55	5,545
October	47	6,755
November	21	14,505
December	47	6,821

*Dipping and baking facilities installed in April.

In the early part of the year it was felt by the management that there were too many failures to cars in service, and a careful investigation was undertaken to determine the cause of this situation. One of the causes of pull-ins was hot journals. For example, in



A Welded Armature Carriage Made of Sheet Metal Moves on a Portable Track

December, 1923, 89 cars were pulled in for this reason, and in January, 1924, the total number of hot bearings was 127, although there were not an equal number of cars taken out of service. High-grade lubricating oil and pure wool waste were being used by the company. Chemical analyses were made of the oil and waste. This

was even carried to a point where the chemical characteristics of the dyes used in the wool were studied. No shortcomings, however, were found with either the oil or the waste.

During the investigation, A. F. Rexroth, master mechanic, visited a number of neighboring railway properties to study their methods of journal lubrication. On a trip of this kind to a property operating under conditions similar to those of the Harrisburg Railway, he discovered that extremely satisfactory results were being obtained with a comparatively low-grade wool waste. It was suggested that the 100 per cent wool used at Harrisburg was too high grade.

Accordingly, it was decided to try a different kind of waste containing only 60 per cent wool. This resulted in an immediate reduction in number of hot journals. Its use has been continued and the results have been most gratifying. The number of hot journals each month is shown in the accompanying table.

HOT JOURNAL RECORD, HARRISBURG RAILWAYS	
Month, 1924	Hot Journals
January	127
February	*108
March	16
April	10
May	17
June	19
July	8
August	8
September	11
October	6
November	8

*Change made in quality of waste during this month.

After nine months experience with the new waste, the company has decided that pure wool waste is unsatisfactory for journal packing. Records show that in Harrisburg trouble was first experienced with this waste when it was about 60 days old. The supposition is that it became glazed on the surface and failed to carry the oil as it should. Moreover, the theory is held that pure wool waste is not as springy as 60 per cent quality and is, therefore, less satisfactory for journal packing.

A SHOP MAN IS STATIONED DOWNTOWN TO MAKE MINOR REPAIRS

Another important step that has been taken to reduce the number of pull-ins at Harrisburg is the keeping of a repair man on duty at the square. At this location, the two principal loops in the downtown district touch and all cars pass this point once on each trip, except for those on a small line in the suburbs which do not come downtown at all. Stationing a repair man at the square, therefore, makes it possible to repair a car in service without pulling it into the shop, unless the defect is serious.

This man is on duty from 7 a.m. to 6 p.m., and the cost of keeping him there has been saved many times over through the elimination of dead mileage by pulling cars in and pulling out other cars to replace them. As the shops are nearly a mile from the central square, this saving has been very considerable. Moreover, there has been a corresponding saving in labor costs, since it is unnecessary to have shopmen take cars downtown to replace cripples and bring in the latter to the shop. As it happens, the one line which does not pass the square does pass right by the front of the railway shop, so that under the present arrangement every car on the system can be repaired on the road if the defect is a minor one.

Proper Equipment Improves Babbitt Room Results

Convenient Arrangement of This Department in the Snelling Avenue Shops of the Twin City Rapid Transit Company, Together with Specially Designed Equipment, Insures Uniform and Speedy Work

AS DESCRIBED in a previous article in the *ELECTRIC RAILWAY JOURNAL* for Nov. 15, page 834, both solid bronze and babbitt-lined malleable shells are used by the Twin City Rapid Transit Company mechanical department for axle bearings and babbitt-lined bronze is used for armature bearings. The babbitting department is therefore considered of equal importance with other shop departments where the machining operations are carried on, and considerable attention has been given to its equipment and arrangement.

Maximum convenience for carrying on the work has been the first consideration. The department is equipped with a number of low, cast-iron top tables, having these heavy tops supported on substantial steel legs. One of these tables extends across in front of the babbitting furnace as shown in the accompanying illustration, so that it is handy to the furnace and also to the tinning tank, which is near one end of the table.

Malleable shells are tinned by using a special non-acid tinning flux which causes the tinning material to adhere properly to the malleable iron. The tinning material is half tin and half lead, and is put into a small rectangular tank set in a convenient location relative to the babbitting bench. A gas flame under the tank keeps the tinning mixture at the proper temperature. The bearing to be tinned is first preheated by immersion in the babbitt pot, either for removal of the old babbitt in the case of an old bearing, or for preheating only in the case of a new bearing. Old bearings seldom require very much tinning to be done before rebabbitting.

When a bearing does require tinning, however, it is set on the edge of the tinning tank as shown in the illustration, the projecting end being supported on a small cross bar, so that it slopes considerably, thus making sure that any surplus material will drain back into the tank.

At the right of the tank, in an earthen pot, is the tinning flux. This is first swabbed on the interior surface of the bearing. An interesting item in connec-

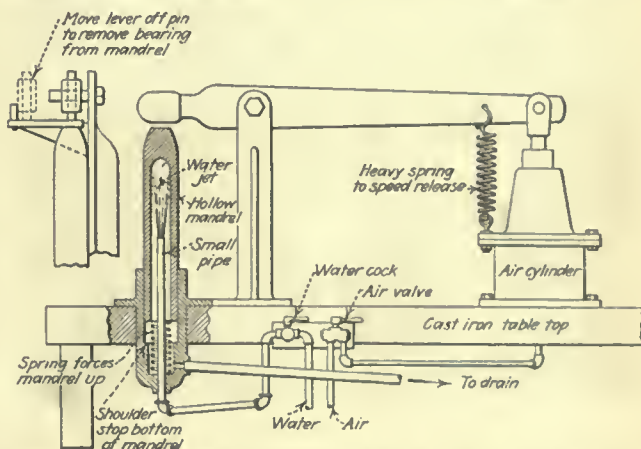


The Tinning Tank and Flux Are Located Convenient to the Babbitt Furnace and Work Bench. The Bearing Is Supported on the Edge of the Tank While Being Tinned



This Brush, Having Bristles Made of Twisted Copper Strands, Is Very Effective for Spreading the Tin on the Inside of the Bearing Shell

tion with this operation, which at first glance may seem to be a very unimportant detail but which is sometimes a considerable source of lost time and annoyance, is the material used for this simple swab with which the tinning flux is applied. It consists of a piece of asbestos cloth fastened on the end of a small wire



A Specially Designed Babbitting Machine Increases Production Over Hand Methods. The Mandrel Is Water Cooled and Is Released from the Babbitt by the Action of the Pneumatic Cylinder and Lever

handle. This is the only material which has been found to resist the corroding action of flux and heat.

Another interesting detail of the tinning operation is the method of applying the tinning material to the face of the bearing. The home-made copper brush, shown in another illustration, is dipped into the molten tin, by passing the long handle through the tinning. The brush is then repeatedly dipped into the tin and rubbed back and forth on the inside surface until the latter is thoroughly coated. The bristles of this brush consist of small twisted strands of fine copper wire, and as one of the brushes lasts for a long time, this method has been found to be much more satisfactory and rapid than that of using an iron to spread the tin.

After the tinning operation is completed the bearing is ready for babbitting. In the case of axle bearings, the babbitt contains a very much higher percentage of lead than for armature bearings. This is true only in the case of malleable-iron shells, of course, as the solid bronze axle-bearing shells are not babbitted. When babbitt is applied to the malleable-iron shells, its thickness varies from $\frac{1}{8}$ in. to $\frac{1}{4}$ in. In armature bearings the babbitt thickness averages about $\frac{1}{8}$ in.

A pyrometer is used in the babbitt pot to check the

temperature, which is maintained at 650 deg. F. to 700 deg. F. Soft babbitt is heated to a temperature of only about 600 deg. F.

For the purpose of increasing the production in babbitting bearings a special machine has been designed, which employs a water-cooled automatic releasing mandrel. Accompanying illustrations show the design of this device. Near one end of the long table in front of the babbitt furnace is mounted an air cylinder and lever, which is supported over the end of the babbitting mandrel so that admission of air to the cylinder will force the end of the lever down on the mandrel. This mandrel itself is hollow, and fits into a steel casting set into the table as shown in the sketch. The mandrel is thus movable within the casting, and



Compact and Convenient Arrangement of Equipment in the Babbitt Room Eliminates Lost Motion and Time. The Babbitting Machine Is Mounted on a Low, Cast-Iron Top Table

is supported on a spring at the bottom. When air is admitted to the cylinder the overhead lever forces the mandrel down in the casting and compresses the spring. A shoulder in the casting limits the distance that the mandrel can travel down. When the air pressure is released the mandrel is forced back into the normal position by the action of the spring.

Leading into the chamber from the bottom of the casting, and extending up into the hollow space inside the mandrel itself, is a small pipe by which a jet of cold water is introduced. A drain pipe leading out from the bottom of the chamber allows the surplus water to flow off. When it is desired to remove the bearing from the mandrel after it has been babbitted, or to replace another one on the mandrel, the lever is moved off the end of the supporting pin and allowed to rest on a short shelf until it is replaced on the pin again after another bearing has been put on the mandrel.

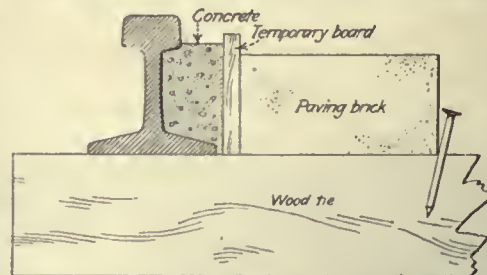
It is evident that this arrangement causes the babbitt to cool quickly after pouring, and the pneumatic device forces the mandrel loose if the babbitt sticks, and avoids any loss of time. With this arrangement, one man babbitts approximately 17 armature bearings per hour on general run work, including the time taken to melt out old babbitt on scrap bearings as well as those that are to be rebabbitted. When babbitting bearings only, one man easily completes 25 bearings per hour.

Concrete Curb Along Rail Reduces Paving Cost

AN UNUSUAL solution of a peculiar paving problem has been made by the Altoona & Logan Valley Electric Railway, Altoona, Pa. In the district where this company operates brick is used almost universally for paving the streets. Some time ago, however, the railway purchased at a bargain 600 tons of 5½-in. T-rail of special section with a deeper head than standard. As it was found impossible to place a 4-in. paving brick under the head of this rail to make a flangeway some other way of doing this had to be devised. The method finally adopted consists of placing what the company calls a "concrete curb" along the rail. This has not only solved the immediate problem, but also has reduced the cost of paving the railway area. The method of installing the concrete curb is as follows: After the ties have been laid and the rails spiked down a board 4 to 5 in. high is placed in a vertical position along the inside base of the rail. This is held in place by two or three paving bricks placed at intervals against it. The paving bricks in turn are held by nails driven part way into the wood ties, as shown in the accompanying sketch. As soon as the concrete has set, the nails, bricks and board are removed. Two rows of brick stretchers are then laid along the



Appearance of Concrete Flangeway and Brick Pavement Used in Altoona



A Longitudinal Board Held in Place by Paving Brick Nailed Loosely to the Ties Is Used as a Form for Pouring the Concrete

inside of the concrete curb and grouted. On the outside of the rail brick headers are placed in the ordinary way. It is estimated by the company that this concrete curb cost about 7 cents per foot of rail. This is less by about 3 cents per foot than the cost of paving brick. Carefully constructed bolted joints are used by the railway, with special plates which were purchased at the same time as the rail. The plates are seam-welded and the bolts are spot-welded with the nuts on the inside. Having concrete alongside the rail instead of bricks makes it unnecessary to resort to special construction where the bolts project inside the rail.

Inspecting Cars on Watt-Hour Basis

The Routine Followed and the Methods Used by the Philadelphia Rapid Transit Company Are Described—Meters Equipped with Three Inspection Dials Provide for Three Periods Suitable for Inspecting Various Parts of the Car Equipment

PASSENGER cars of the Philadelphia Rapid Transit Company have been inspected on a watt-hour basis for the past several years through the use of Economy watt-hour meters installed on the individual cars. The energy consumption has been calculated so that the inspection periods correspond quite closely to a mileage basis. The meters are equipped with three registration dials in addition to the regular registering dials for recording watt-hours to give the energy consumption record. These inspection dials are referred to as "A," "B" and "C." On 310 of the meters the three dials are calibrated to register 5,000, 15,000 and 30,000 kw.-hr. respectively. On all the other meters the dial indications per revolution are 3,000, 15,000 and 30,000 kw.-hr. respectively.

Each dial is equipped with two hands, one stationary and one traveling. The stationary hands are set in

accordance with the average kilowatt-hour consumption per car-mile for various types of cars at each of the carhouse locations. The stationary hand can be reset to indicate on the dials the proportional kilowatt-hours consumed in operating a given number of car-miles for an "A," "B" or "C" inspection.

The factor for reducing kilowatt-hours per car-mile to obtain car mileage will necessarily vary with lines, but in order to provide a uniform basis for each of the 15 inspection shops, an average of the car lines operating from each particular shop is obtained. Thus, if there are five lines operating from a shop, the factor chosen for reducing kilowatt-hours per car-mile to car-miles is the average of the five lines. The variation from the definite mileage inspection as used is less than 5 per cent. In order to make sure that operating conditions are taken care of and that the constant used

[illegible][illegible][illegible][illegible]

The Car Report, Form 7140 (8 1/2 in. x 11 in.), is kept for each individual car, recording inspection dates and failures. Both sides are filled in.

[illegible]

The Daily Report of Cars Inspected by Meter Dials, Form 7126 (5½-in. x 8½-in.), is Filled In by the Car Placer

Inspection Report Forms and Records Used in Philadelphia

The Report of Cars Pulled In, Form 7094 (8½ In. x 11 In.), Is Used Whenever a Car Falls In Service

This report must be made out in Duplicate: One copy sent to Superintendent Keller, State and National Bank, and one kept on file at Car-House.

actually represents the character of service from a particular depot, a check is made about three times per year.

The system is working very satisfactorily and is more convenient than the mileage system formerly used. One clerk takes care of the necessary records, so that no additional force is required over that previously used when the mileage basis was employed. The number of cars which come in for inspection each day is quite uniform, and little trouble is experienced from cars being bunched one day with very few the next. The uniformity is shown by the accompanying table of total inspections for the month of August.

All surface cars, with the exception of old equipment, are inspected according to a schedule designated as A, 500 miles; B, 2,500 miles, and C, 7,500 miles.

SPOTTING CARS FOR INSPECTION

After an inspection has been made the carhouse foreman or his assistant unlocks the resetting device on the meter and turns the traveling hand back to zero. Meters are inspected each night by car placers. On Form 7126, designated as "Daily Report of Cars Inspected by Meter Dials," the car placer each night enters carhouse number, date, serial numbers of cars due for inspection, and inspection letter, this being determined from the position of the traveling hand relative to the stationary hand on the inspection dial. Such cars as are found to be due for the various inspections are blocked in the carhouse so that they will be held for inspection the following day, or if necessary they may be operated as morning rush trippers.

The night foreman must make out a work sheet for each man in the crew. This sheet is ready for the

men when they start work in the morning and it must be signed by the men and turned into the carhouse office at the end of each day. The carhouse clerk transfers the data to individual car record cards, designated as Form 7140. The foreman or his assistant must personally check all cars due for inspection, reset the dial hands to zero and take a statement of the meter on each car.

The carhouse clerk enters the meter reading in the column under "Miles" and subtracts the previous meter reading from the last reading, which gives the total kilowatt-hours consumed since the last inspection, which in turn is divided by the kilowatt-hours per car-mile which has been determined for that class of car at this particular depot. He then enters the miles that the car traveled for that inspection under the present meter reading. Form 7126 is filed away for 60 days and then destroyed. Form 7140 is kept in the carhouse office in the active file until both sides of card have been filled. It is then transferred to an inactive file, where it can be referred to whenever it is desired to determine what troubles a car has shown or for checking mileage of any particular piece of equipment.

The type of inspection used includes first the class "A" inspection, made every 500 miles, which in Philadelphia runs between 4 and 5 days. When a car comes in with the meter dial indicating that it is due for class "A" inspection, the car placer turns this over to the inspection force, repair crew, or cleaning crew, as is necessary. The inspection made consists of the examination of all parts to make certain they are in good condition and for the replacement of pins, cotters, screws, and the like which can be done quickly. Details of work done follow:

CLASS "A" INSPECTION

Trolley—The trolley wheels are gaged, and if they have reached the condemning point they are replaced. Bushings, contact springs, washers, pole, trolley stand, trolley lead, rope and catcher must be inspected, repaired if necessary and all worn parts replaced. A drop of engine oil is applied to trolley contact washers and stands and catchers are lubricated. The trolley rope must be of sufficient length for the pole to reach 23 ft. high.

Controllers—Controllers are inspected for broken or worn-out fingers and segments, which are replaced where necessary. All old grease must be wiped from the contacts. Fingers are adjusted to give $\frac{1}{8}$ in. pick-up to the finger. All dust and dirt are brushed out of the controller with a special brush, and the controller is thoroughly inspected for blisters and burns on the controller cylinder or the base of the fingers. These are filed and thoroughly cleaned. If necessary a very thin coating of shellac is applied to the parts where carbonization has been found. The deflector boards are scraped and brushed to remove the copper dust. Controller segments are lubricated with vaseline or petroleum jelly. Bearings are oiled and the tops of controllers are cleaned of all dirt and grease. In general the controller must be placed in such a condition that it will give no trouble before the next inspection.

Brakes—Brake inspection consists of

inspecting the entire brake rigging, on both body and trucks. If shoes, pins or levers are worn they are replaced, as well as any other part worn to a condemning point. Loose bolts are tightened.

Slack adjusters are inspected carefully and the brakes are applied and released several times to determine if the slack adjuster is functioning properly. If not, it is removed and replaced by one in good order. On cars equipped with solid turnbuckles, manual adjustment of brakes is necessary and the inspector places a pinch bar at least 5 ft. long with one end under the transom iron of the truck and the other end against the brake beam. He then puts his weight against the end of the bar so as to force the beam away from the wheel. With proper adjustment, he will then be able to shake the shoe in the holder with his fingers. This is done on each wheel of the truck. The same procedure is followed on cars equipped with slack adjusters.

The inspector checks air pressure to see that it stands at a minimum of 65 lb. and a maximum of 75 lb. If he finds a variation of pressure he reports it to the foreman or his assistant. Side bearings are lubricated with one part reclaimed compressor oil and two parts of track oil, applied with a $1\frac{1}{2}$ -in. brush.

Fenders—All fenders are tripped from the platform with the plunger and with the tripping gate. They are also reset from the platform to determine if

they are in good working order. Fender parts, including tray and trip gate, are lubricated and any worn or broken parts are replaced.

Glass—All broken glass is replaced, while cracked glass is replaced only when the foreman or assistant foreman finds it necessary.

Window Catches—Window catches on green cars are thoroughly inspected, and where found defective they are replaced with good-order catches.

Seats—All seats are thoroughly inspected, particular attention being given to castings of side supports, broken slats and protruding nails. Defective seats are repaired or replaced.

The foreman or his assistant then inspects the entire car to determine if proper inspection and repairs have been made.

CLASS "B" INSPECTION

The inspection work of all parts as listed under the class "A" inspection is repeated on the class "B"; in addition the following work is done:

Motors—All worn-out or chipped brushes are replaced and the brush springs are inspected for weakness or breakage, commutators are inspected for flash-over. The brush-holder yokes on motors equipped with old-style yokes are thoroughly inspected for a deposit of carbon dust or carbonization. Brush-holders and yokes are wiped clean on motors without brush yokes,

insulators are wiped clean, and the inspection of holders is carried on in the same manner as outlined above. The armatures are inspected for low bearings, and if any are found they are reported to the foreman or his assistant.

Field coils are inspected carefully and gears and pinions are tried for looseness and are lubricated. On the GE-80 motors the waste is raised and the piece of waste resting next to the armature shaft is replaced by a fresh piece and free oil is placed on top of the waste. On all box-frame type motors the oil is not applied to the waste, but is poured into the well that is provided in the motor end housing, which allows the oil to go down into the waste at the bottom of the well, and the capillary action of the waste takes the oil from this reservoir to the armature shaft. All motor leads and cables are inspected and repaired where necessary. All dirt accumulations around the edges of trapdoors are removed so that the trapdoor in the car floor fits properly. Motor bolts, including axle cap, gear case, armature bearing and suspension bolts, are tried for tightness. Axle bearings are examined for wear and those found worn to the scrapping point are replaced.

Lightning Arresters—From April 1 to Sept. 1, lightning arresters are thoroughly inspected on "B" inspection. During the winter, arresters are cleaned on "C" inspections, and those of the adjustable type are adjusted according to a gage furnished for this purpose.

Sanders—All sander parts are thoroughly inspected and repaired or replaced where necessary, to allow proper functioning. Sand hose is inspected for leaks. The ends of hose must be in proper alignment with the rail to make certain that sand will drop on the rail when applied.

Doors and Steps—All doors and steps are inspected and adjustments are made where necessary. Where required all moving parts are lubricated. Doors operated by pneumatic engines have all surplus grease wiped from the engine as well as from underneath, to prevent grease from dropping into the car. All pneumatic doors must open and close in 4 seconds. Door engines must cushion properly. Door control rods and handles are kept clean at all times by men assigned to work on doors.

Engineer's Brake Valve—Engineer's valves are inspected and if not working freely K-000 grease is applied. The engineer's valves and pipes connected to them are kept clean at all times by men who are assigned to work on air equipment.

Gongs—Gongs are inspected and tested to see that they operate properly and that all parts are tight. They must be so adjusted that they can be operated with either toe or heel. Lubricant is used where necessary.

Rheostats—All rheostats and tubes are inspected for looseness and to make certain that no loose or warped resistance grids exist. Leads must not foul underframing. Defective rheostats are removed as a unit and are sent to the shop for repairing.

Circuit and Line Breakers—The circuit and line breakers are examined

and brushed out and all worn parts are replaced.

Air Governors—Air governors are inspected as to condition of contact points and for parts that show wear, worn parts being replaced where necessary. The adjustment must be correct so they will cut in at 65-lb. and out at 75-lb. pressure.

Air Compressors—The air compressor motor is examined for condition of commutator and brushes and is lubricated if necessary. This is done by removing the plug from the oil pipe. If the oil is level with the top of the plug hole, no oil is added. If below, enough oil is poured in through the plug hole to bring it level with the top of the hole. Air vents under the front head and directly under the compressor are cleaned.

Emergency Jacks—Jacks are raised and lowered to see that they are working properly and a drop of oil is applied to the working parts. When found defective they are replaced and the defective jacks are sent to the shop for repairs.

Switches—All switches, including air, light, drum, headlight and auxiliary circuit, are inspected to see that they are working properly. If defective they are replaced.

Couplers—The Tomlinson couplers, carriers and radial bar slides are inspected to see that they are working properly and are lubricated if necessary.

Trolley Catchers and Retrievers—Where bad-order trolley catchers are found they are replaced and the defective ones are sent to the shop for repairs.

Heaters—During the winter months heaters are inspected for defective coils and switches. If coils are found defective the heater is removed as a unit and sent to the shop for repairs.

Head and Tail Lights—All electric head and tail lights are cleaned thoroughly.

Hand Rails—All hand rails except those treated with enamel are painted, together with all malleable-iron window-wiper castings.

CLASS "C" INSPECTION

When a car is due for "C" inspection, the foreman or his assistant makes a very detailed and minute inspection of all car parts. Whenever any part is found worn or in need of replacement he marks that part with a piece of chalk so that the inspection crew will see it readily and make repairs. The carhouse clerks check all cars on "C" inspection to determine the proper setting of meters. The trolley inspection is the same as that outlined under "A" inspection, but in addition the stand is inspected more carefully for wear and is replaced if necessary. The pole and stand are painted with asphaltum paint if necessary, and the tension of the trolley stand is measured with scales provided for this purpose. The tension of the trolley pole is adjusted to 25 lb. with the

trolley wheel 17 ft. from the ball of the rail on all cars, except on the pay-within type, on which it is adjusted to 30 lb.

Controller, Circuit and Line Breaker Inspection is the same as outlined under "A" and "B," with the exception that these three pieces of apparatus are blown out with compressed air and all parts damaged by flash or carbonized are thoroughly cleaned and painted with very thin shellac.

The line breaker cover is thoroughly cleaned with a wire brush and painted on the outside with black asphaltum, as a rust preventive. Fenders are inspected the same as for "A" inspection and sanders the same as for "B" inspection. The brake inspection, as far as adjustment and inspection of the apparatus is concerned, is identical with that outlined under "A" inspection, with the following exceptions:

Brakes—All worn brake-hanger slides and guides are replaced, the piston in the air cylinder is turned one-quarter turn to distribute the wear on the leather, slack adjusters are removed, cleaned, packed with grease and replaced. When worn, they are sent to the shop for repairs. All levers, including body, upright and connecting rods, are removed from the car, thoroughly cleaned and all parts are inspected for wear. All brake pins and levers are lubricated with journal oil, track oil being used only on the side bearings.

Trucks—Journal boxes are examined to see that the waste has not worked away from the journal; if found away it is pushed back into place. At the discretion of the foreman or his assistant, if the waste looks dry, or the journal gives any indication of excessive heating, the journal box is repacked. The journal bearing brasses are inspected and if the condemning point has been reached they are replaced.

All truck parts are inspected for loose bolts. These are tightened or replaced, and if any cracked or broken parts are found they are replaced. The car body is raised sufficiently to allow oiling of center bearings and side bearings of the slide type. Drawbars and couplers are inspected for wear and the radial drawbar slide on Tomlinson couplers is lubricated so that the carrier moves freely.

Motors—The motor inspection is carried out the same as outlined under "B" inspection. In addition, dirt is blown from motors by means of compressed air. Brush-holder tension on all motors is tested and the tension is adjusted on all adjustable brush-holders to the company's standard, information regarding which is provided on separate sheets.

The waste in armature and axle bearings on modern-type motors is turned so that fresh waste rests against the armature shaft or axle. On old-style motors, the waste is withdrawn and a fresh piece is placed next to the shaft. All oil-box lids are examined and any that are loose or missing are repaired or replaced. Clearance between the axle bearing head and axle collar is checked, with the motor

forced against the gear. If the bearing heads have worn so that the clearance between axle bearing and axle collar is greater than $\frac{1}{4}$ in. the axle collar is reset so that the clearance is less than that amount. If at this inspection any motor leads are found to have been connected with two-way connectors due to making temporary repairs the motor leads are replaced. The waste removed from the armature bearings on this inspection is examined by the foreman or his assistant, to determine whether it can be used for axle or journal boxes.

Doors and Steps—The door and step inspection is carried out in the same manner as outlined under class "B," excepting that the pneumatically operated doors are timed to determine that they open and close in 4 seconds.

Air Equipment—Engineer's brake valves are inspected in the same manner as outlined under class "B" inspection. The air compressor also is inspected and oiled in the same manner as under "B," with the exception that before the brush-holders and brushes are cleaned, the dirt from the motor is blown out with compressed air. The air governor inspection is the same as outlined under "B." The emergency valves, such as are used on the SK and SPC type cars, are examined and operated to determine that they function properly. If any of these valves are found to be in bad order or working sluggishly, the valve is removed from the car, a block is bolted to the open end of the valve to keep out dirt and it is then sent to the shop for overhauling and repairs.

Fuse Boxes—Fuse boxes are inspected to determine if the binding screws and wedges are functioning properly and all dust is blown from them with compressed air. The lids must be in first-class condition. After cleaning, fuse boxes are painted with insulating varnish, both inside and outside. A drop of oil is put on the binding screws and the leads in the rear of the fuse box are painted.

Car Body—All seats are inspected as

to their condition, and particular attention is given to broken or cracked castings in the side supports. Seats must be fastened accurately to the wall and floor. All torn and broken seats or seat backs are replaced. Car-body fixtures as a whole are carefully inspected, including emergency jacks. Jacks must be raised and lowered. If a jack functions improperly, it must be replaced with a good-order jack and the defective one sent to the shop for repairs.

In addition to painting the hand rails and window wipers, the headlight and bumper are painted with asphaltum paint. All switches, including air, light, heat, drum and those of auxiliary circuits, are examined and are put in proper working order, by repairing or replacing. Broken or cracked glass is replaced. The register is removed, inspected, and lubricated. Any defective register backs are replaced and the defective ones sent to the shop for repairs.

On cars which are operated in trains, a careful inspection is made of the bus-line jumpers and couplers to see that they are in good order, also that the bus-line jumpers are provided with standard supporting springs and latches.

The air governor is cut off and the air pressure allowed to increase to determine whether the pop valve will open at 90 lb. If it does not, the valve is sent to the shop for repairs and is replaced with a good-order valve. No car is allowed to operate with a pop valve functioning improperly. The emergency valves on all types of cars are cleaned thoroughly and then are tried to determine if they function properly.

After each inspection is finished the foreman or his assistant makes a very careful examination of all work that has been done to see that it has been properly executed. He then signs the car inspection sheet, Form 7126.

GENERAL INSPECTION

A number of items require less attention than at any of the regular periods. These are covered in a general inspection in addition to regular inspections. Several of these are mentioned in the following paragraphs:

Journal boxes are repacked as follows: Curtis D-2, Brill 27 (old type), Brill 39-E and Brill 43-E pony journals on every third "C" inspection, or 22,500 miles. The Brill 39-E driver, Brill 43-E driver, Brill 77-E, Brill 79-E and Brill 27 (new type) journal boxes on every fourth "C" inspection or 30,000 miles. Waste is removed from the journal boxes and if found in good order it is reclaimed. Bad waste is thrown away.

Wheels are inspected for wear and for bad-order flanges by the assistant foreman the first of every month and a record is kept of wheels to be changed. The armature and axle bearings are repacked at the same time as the journals. Waste removed from the armature bearings is used for repacking the axle bearings after taking on particles of waste, hardened or filled with dirt. Whenever a new journal brass is installed the brass on the other end of the axle must be of the same thickness as the new one. A tolerance of $\frac{1}{8}$ in. is allowed.

Circuit and Line Breakers.—Every 6 months the circuit and line breakers are tested with a water barrel resistance. On all two-motor cars the breakers are set to open at 300 amp. as shown on an ammeter, which is in circuit with the water rheostat. On all four-motor cars they are set to open at 350 amp.

When line breakers are checked as to setting on cars equipped with PC control, the relay is examined and adjusted so that when feeding, the relay will not allow the controller to operate rapidly enough to blow the line breaker before the car has accelerated to maximum speed.

OVERHAULING

When trouble is found which necessitates the removal of the car to the overhauling bay for changing wheels, armatures or any work which requires the raising of the body, the assistant foreman in charge of overhauling makes out a detailed report. Such work as is done in the overhauling bay must be indicated on this report, which is then turned into the carhouse office. On Form 7140 are shown repair symbols which are used for entering the repair data on the card in the column "Repairs." For example, when a shorted armature is changed in the shop the number of the motor has AS written back of it. If this trouble repeats, the fields are tested with a Century field tester. Low resistance fields are removed. The recording of all work as shown by the repair symbols on the car record card is entered in the same way as the work is done in order that a continuous check on the performance of the equipment may be had at all times. Whenever wheels are installed the symbol WC is placed back of the number of the set, and the word "new" or "re-

turned" is written in the column under repairs, so that the number of miles traveled by a new wheel or a returned wheel can be determined from the cards.

PULL-INS

Form 7094 is used by the Philadelphia Rapid Transit Company for pull-ins. Whenever a car fails in service and is pulled in, the number of this car is entered in the column "Car In" and the number of the car taken out is entered in the column "Car Out." The route and block number of the car that is pulled in and the type of motor with which the car is equipped are entered in their respective columns, together with the time the pull-in was made. The trouble reported is entered on the card exactly as reported to the carhouse foreman by the transportation department, at whose request the car was pulled in, and the exact trouble found is written in the column headed "Trouble Found." If the car is found to have trouble other than that for which it was pulled in, the exact trouble found is written on this sheet. Each day the foreman fills in the report

of cars operated, etc., in the section shown at the lower left-hand corner of the pull-in sheet. This shows the total number of scheduled cars and wilcats operated, also the number of surplus O.K. cars, short of schedule, disabled for carhouse, disabled for shop, at shop for repairs and at shop for paint. This information is entered each day and is carefully totaled to show the total assignment of cars at the particular depot making out the form. The day foreman signs this sheet above the line at the lower right corner. When completely filled out in duplicate the original is sent to the general office and the carbon copy is retained at the carhouse. The clerk at the carhouse transfers the pull-in information from this sheet to the car card,

RECORDS OF TOTAL CAR INSPECTIONS FOR PHILADELPHIA RAPID TRANSIT COMPANY, AUGUST AND SEPTEMBER, 1924

Day of Month	Inspection Class*				Inspection Class*			
	"A"	"B"	"C"	Total	"A"	"B"	"C"	Total
	August				September			
1	241	53	29	323	172	38	11	221
2	240	49	22	311	247	58	27	332
3	188	51	22	261	261	65	30	356
4	214	54	37	305	227	55	32	314
5	228	64	39	331	241	59	32	332
6	225	60	41	326	221	46	25	292
7	224	64	27	315	196	37	26	259
8	253	51	30	334	243	52	28	323
9	226	53	27	306	238	59	28	325
10	195	43	14	252	253	58	20	331
11	228	46	27	301	229	54	18	301
12	282	44	29	355	245	66	23	334
13	234	55	27	316	222	47	24	293
14	222	49	34	305	204	54	13	271
15	261	39	32	332	231	46	37	314
16	236	52	34	322	271	66	34	371
17	203	41	17	261	240	74	30	344
18	229	42	30	301	250	47	32	329
19	269	45	34	348	256	69	25	350
20	235	65	38	338	220	21	18	309
21	233	41	26	300	218	49	15	282
22	237	64	28	329	252	52	25	329
23	252	33	21	306	261	50	23	334
24	208	45	18	271	259	55	19	333
25	221	46	38	305	243	59	21	323
26	265	47	31	343	288	71	19	378
27	245	55	25	325	238	53	28	319
28	238	59	32	329	234	53	13	300
29	235	63	27	325	204	52	29	285
30	220	50	20	290	224	62	22	308
31	182	44	19	245	....	....	...	....
	7,169	1,567	875	9,611	7,088	1,677	727	9,492
Aver. per day....	232	50	28	310	236	56	24	316
* "A," inspection 600 miles; "B" inspection 2,400 miles; "C" inspection 7,200 miles. The inspection schedule was changed Nov. 4, 1924, to "A" 500 miles; "B" 2,500 miles; "C" 7,500 miles.								

*"A" inspection 600 miles; "B" inspection 2,400 miles; "C" inspection 7,200 miles. The inspection schedule was changed Nov. 4, 1924, to "A" 500 miles; "B" 2,500 miles; "C" 7,500 miles.

Form 7140, using the appropriate abbreviations, so that if a car is pulled in for the same trouble, such as bad brakes, twice in succession, the clerk will report this to the foreman. All pull-ins are treated in the same manner.

On entering the pull-ins on the car record sheet it is possible at all times for a foreman to know and to be able to check who did the work on the car that failed on the street.

Whenever any car parts are put on test by either the testing division or the shops, the part of the apparatus that is on test is entered on the particular car record card. Whenever a part on test shows weakness, wear or breakage, it is reported immediately to the office of the test engineer and the part is held for his inspection.

Whenever a storm occurs, regardless of what nature, the night foreman assigns a man to lubricate all slides on the slide-type doors which are exposed to the weather.

MATERIAL FOR REPAIRS

All parts removed from cars that require shop repairs are tagged properly, giving the nature of the defect and the depot number.

On or about April 15 of each year all snow equipment is cleaned and inspected prior to summer storage. A report is submitted by each carhouse foreman to the general carhouse foreman itemizing snow equipment defects that require shop repairs. Motor lids and inspection plates are removed from all non-ventilated motors, and these are stored for replacement during winter months. Window slides on all cars except those equipped with metallic posts are greased with "Smoothene." On cars with metallic posts the slides are wiped with turpentine.

On or about Sept. 15 repairs are made to all car heaters and the inspection of snow equipment is started so that it will be in good operating condition by Nov. 1. On Dec. 1 motor lids and inspection plates are reinstalled on all non-ventilated motors.

Special Corps Repairs
Fare Boxes

Branch of Traffic Department, Organized in St. Louis and Known as Defective Fare Box Department, Is Responsible for Keeping Fare Boxes in Good Condition

BY THE plan of organizing a special department for the examination and repair of defective fare boxes, the United Railways of St. Louis, under the supervision of its general traffic department, has perfected a system for handling fares which has greatly reduced its losses from theft.

The United Railways installed registering fare boxes on its cars in December, 1918. During the following three years there were discrepancies in the registration of fares which resulted in controversies between conductors, superintendents, and other officials. This led to the organization on Feb. 1, 1921, under the direction of the traffic department, of a "defective fare box department," which has almost entirely eliminated claims against the company.

Naturally, anything of a mechanical nature will get out of order and show defects, because of rough usage, wear of parts, or lack of attention as to cleaning, etc. In addition, in the case of fare boxes, there is the danger over which conductors have no control that passengers will place in these boxes mutilated coins and foreign substances of all sorts, which frequently put the boxes out of commission.

DEFECTIVE BOX REPLACED AS SOON AS POSSIBLE

When a conductor discovers that his box fails to work properly, he is permitted to allow passengers to deposit their fares as usual, but he makes no attempt to register these fares with the registering device of the box. He then must communicate as quickly as possible with the nearest station, through a supervisor or such other official as he may pass en route to the station. When he arrives at this point, the defective box is removed and a new box is placed on the car. The defective box is immediately tagged with the form shown in the first reproduction. The signature called for on this tag is that of the person removing the box. On the reverse side of this tag there are the following blanks: Run number . . . , line . . . , badge number . . . , telltale.

The responsibility for the box, after it has been taken off the car, is with the superintendent of the

division, and it is placed in special storage and is not disturbed by any one until the following day.

Each day there is an automobile service to outlying stations for defective fare boxes by representatives of the defective fare box department. On this trip the defective boxes are changed for boxes in good order, and a receipt is given and taken for boxes delivered and received on special forms provided for this purpose. Defective boxes are then carried to a special office adjacent to the headquarters of the traffic department. Here they come under the attention as to their defects by mechanics who, for this purpose, are under the direction of the traffic department. As each box is opened, a representative of the treasury department is

the result of the test is recorded in the third blank illustrated. As will be noticed, this blank provides space for the signature of the superintendent or foreman and also for the signature of the conductor. The blank is then forwarded to the transportation department and shows that the box either registered correctly or incorrectly. This system was begun on May 1, 1922.

As an illustration of the effectiveness of this inspection, during the month of July, 1924, the transportation department had seventeen claims of defective boxes, and of this number only one claim was allowed. Altogether on this system, the company has about 1,700 registering fare boxes, and the average number found to develop trouble of some kind each day is about 20.

ADJUSTED BY

UNITED RAILWAYS COMPANY OF ST. LOUIS
ROLLA WELLS, RECEIVER

RECORD BY

No 1301

TE

FARE BOX NUMBER

CAR NUMBER

SHED NO.

CASH REGISTER

CASH RECORD

TOTAL CASH

TOTAL REG.—S

TOKEN REG.—L

CONDUCTOR

DUE

CAUSE OF DEFECT

DISPOSITION

Register Reading of Fare Box No.

Taken from Car

Box No.

Date

Division No.

Station No.

REGISTER READING WHEN TAKEN OFF CAR

COIN

Small Ticket

Large Ticket

REGISTER READING AFTER TEST IS MADE

COIN

Small Ticket

Large Ticket

This Box is found to register

Correctly

Incorrectly

Signature of Conductor

Signature of Supt. or Foreman

NOTE: This form to be used ONLY on claim of Conductor that fare box does not register correctly. Test must be made in presence of the Superintendent or Day Foreman and the conductor making claim.
TEST MUST BE MADE AT FIRST AVAILABLE MOMENT AFTER BOX IS REMOVED FROM CAR.

FARE BOX REMOVAL TAG

SHED NO.

CAR NO.

DEFECTIVE BOX NO.

SUBSTITUTED BOX NO.

DATE

TIME

PLACE REMOVED

SIGNED

Forms and Tag Used by United Railways of St. Louis in Handling Fare-Box Repairs

No. 1. Record kept of contents of defective fare boxes and adjustment required to put them in good condition.

No. 2. Form used to record result of the test when conductor claims that fare box does not register correctly.

No. 3. Tag attached to defective fare box when removed from car. It is signed by the man removing the box.

present and a proper record is made of the contents of the box on a form provided for this purpose. This shows the amount due to the conductor according to the register and the amount due to the company as not having passed through the register.

The defects in the box are then corrected and a careful record is kept of what has to be done to each box, together with the box number, car number, number of conductor in charge, and cause of defect. A cross-file is kept of the conductors sending in defective boxes. This system has reduced to a minimum the use of trick coins.

CHECKS MADE OF REGISTERING MECHANISM

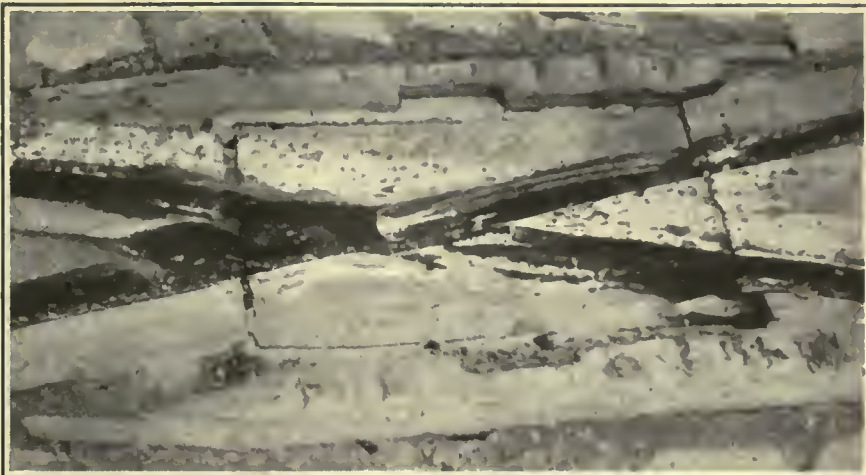
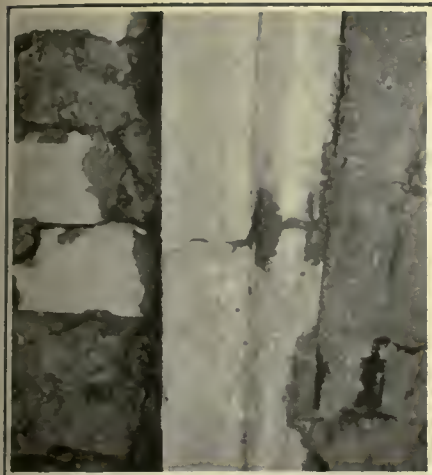
The defective fare box department not only cares for boxes which become choked up or otherwise obviously are out of order, but also cases where the conductors claim that a box is registering more than it should and that he is consequently entitled to a refund. In cases of this kind, the procedure is for representatives of the defective fare box department to test the box out in the presence of both the superintendent or foreman of the station and of the complaining conductor, when he is off duty. The test consists of running through the box a certain number of coins, as specified in instructions drafted for this purpose, and

It may be added that the company has found a system not only valuable as a rapid method of detecting and correcting fare boxes, but it has also been of great benefit to the employment and record department in its work of keeping tab on conductors.

Railway Edition of Pittsburgh Guide Published

THE 17th edition of Lewis' Pittsburgh Guide is known as the Pittsburgh Railways Company edition. Besides the usual list of public buildings, theaters, banks, monuments, charitable institutions and the like, the guide contains a complete list of all the routes operated by the Pittsburgh Railways, together with the route numbers and headways. At the bottom of each page are printed a few words telling the advantages of using the railway. The route numbers of the car lines to take to reach any point in the city are shown in the list of streets and house numbers.

The railway has purchased 5,000 copies at a cost of \$2,500 for distribution to its motormen and conductors and to the traffic policemen in the city. The remaining 80,000 comprising the issue will be sold at news stands and book shops.



At Left, Cupped Rail Repaired by Adding New Material with an Arc Welder. At Right, Manganese Cross-Over Points, Built Up by Arc Welding. Such Repairs Have Stood Years of Service

Maintenance Repairs by Welding

Methods of Filling in Cupped Track Joints and Making Repairs to Corrugations—Costs Given for Various Repairs to Rolling Stock by Welding

BY J. F. LINCOLN

Vice-President and General Manager Lincoln Electric Company,
Cleveland, Ohio

THE passing of car wheels from one rail to the adjacent one, where cars pass in one direction only, pounds out a cup on the second rail. This results from a breaking down of the roadbed, so that it gives an insecure foundation for the joint. The constant pounding soon loosens the bolts which hold the fishplates, and the jar from passing cars becomes more severe. When such a cup has been formed, it is necessary either to take out the rail and install a new one or to repair the old rail by welding. Where the track is in bad condition and all rails are well worn, the introduction of a new rail is not desirable as conditions cannot be made satisfactory. In such cases the usual procedure is to take up all the track where the trouble occurs and re-lay new rails. The expense of doing this is, of course, very high. For such cases it will be readily appreciated that welding offers a considerable saving and there are many cases where tracks have been kept in service by

the use of the arc welder for three or four years in addition to the ordinary life of the track.

When once a rail begins to show corrugations its deterioration is rapid. Therefore it is advisable to make repairs as soon as possible. The metal electrode process has been found quite satisfactory, and after metal has been filled into the various grooves the high spots may be ground off with some form of grinder.

In grinding, some companies use only a reciprocating grinder, while others use both the hand and reciprocating types. The reciprocating process seems to be preferable because it is more economical. The rate of grinding with a hand grinder is rather low and where the filled-in section is considerably higher than other parts of the rail, an excessive length of time is required to bring it down to proper surface.

There are several kinds of electrodes used in the repair of wearing surfaces on rail sections. For carbon steel frogs and carbon steel rails a 60 or 70 per cent carbon steel welding rod gives the best results. This welding rod produced a dense, tough metal of excellent wearing quality. On manganese steel inserts, frogs or cross-overs a 12 to 14 per cent manganese rod should be used.

The general tendency up to the present time has been to use welding rods too large in diameter for the work. High carbon and manganese steel rods often present some difficulty to the operators in order to get a perfect fusion, and the general tendency is to get a sufficient



Supporting Flange Welded to Gear Case, Using Electric Arc Welding

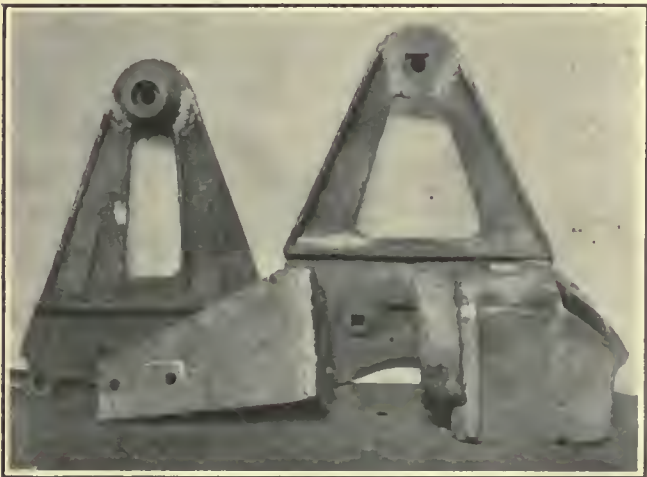


Broken Parts of Truck Frames Repaired by Arc Welding

amount of heat by using large rods. These cause damaging thermal disturbances of the metal in the rail head section. Rods of $\frac{3}{4}$ -in. or $\frac{1}{2}$ -in. diameter are recommended for the work. The welding rod may be used bare with entirely satisfactory results. There is, however, some preference among operators for welding rods which have a sodium silicate and lime covering. The tendency of the covering is to quiet the molten metal and to make it easier for the operator to get a perfect fusion.

WELDING ECONOMICAL FOR CAR REPAIRS

The sudden starting and stopping with the consequent reversal of strains in all members of cars results in excessive wear at all points where car framing is



Truck Side Frame Repaired by Electric Arc Welding. Breaks in the Frame or Worn Bolt Holes Can Be Repaired in This Way. The Holes Are Filled in with New Material, then Redrilled

fastened together with rivets or bolts. Also, as there are many moving parts, the rubbing of one over another causes rapid wear. Worn car parts must either be repaired by adding new metal through welding, or the part must be scrapped and a new one installed. It is obvious that the repair of such parts by adding new metal results in a large saving. Also, there are many cases where repairs can be made without dismantling equipment and in such cases the use of welding results in additional saving.

Some figures showing the relative cost of welding by either the oxyacetylene or by the arc process may be interesting. The cost of operating an oxyacetylene torch for repair work of this nature varies from 60 cents to \$1.50 per hour, with an average in the neighborhood of \$1. This takes into consideration the preheating on steel work which is necessary. The following table gives some costs on typical miscellaneous jobs encountered in an electric railway repair shop:

COMPARISON OF REPLACEMENT COSTS WITH COST OF REPAIRS BY WELDING

Description of Job	Cost of Replacement	Cost Using Oxyacetylene Torch	Cost Electric Arc Welding
Bearing housing made of cast steel—repair job.....	\$8.60	\$2.60	\$0.75
Axle cap—renewing dowel pin-holes.....	11.15	.70	.25
Repairing armature shaft, pinion seats and keyway.....	54.00	7.20	1.75
Journal boxes repaired by use of chafing plate.....	6.90	.80	.20
Truck frame.....	60.00	3.00	1.10
Resistance grids—typical repair job.....	3.00	.65	.20
Reducing bore of gear. This job impractical with oxy-acetylene. Reduction too small for use of bushing.....	30.00	....	4.10

The metals encountered in the repair of cars include cast steel, cast iron, wrought iron, mild steel and bronze. All of these can be successfully handled in the railway repair shop. A large percentage of the work can be “bench work,” and preheating furnaces and torches can be used to good advantage.

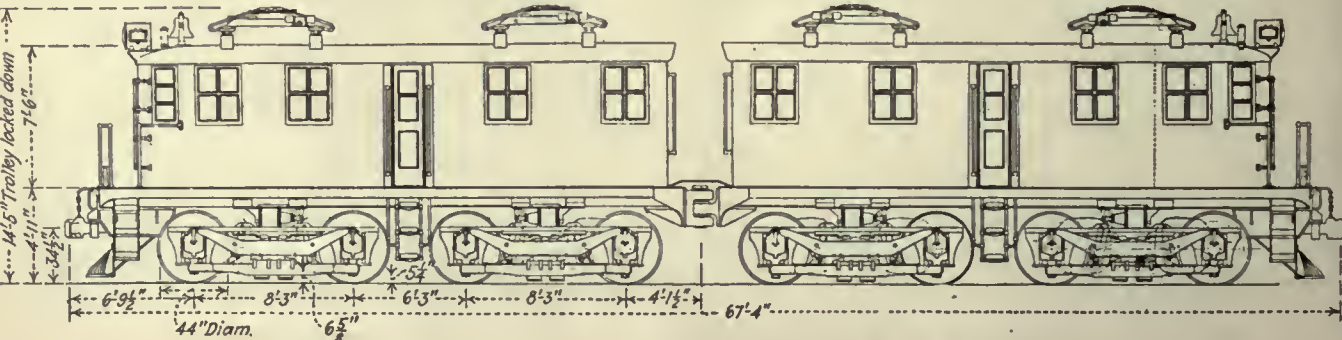
In repairing cars there are many jobs of exactly the same nature since the car equipment is standardized to a large extent. This justifies the spending of a considerable amount of time to solve a particular problem, since similar jobs will recur from day to day.

The capacity of the equipment required is 200 to 300 amp. This permits the use of the machine for either carbon or metal electrode work, on any kind of a job that will arise. There are few cases where it would be necessary to couple two of the units together to get a higher capacity.

Experimental Locomotives for New York Central

Seven Switching and Two Road Freight Locomotives to Be Built Jointly by General Electric and American Locomotive Companies Will Be Equipped for Both Overhead and Third Rail Current Collection

IN ANTICIPATION of the future electrification of the West Side freight tracks running from Spuyten Duyvil to Canal Street in New York City, the New York Central Railroad has placed orders for seven 100-ton electric switching locomotives and two 170-ton road freight locomotives. These will be put in service on the electrified division operating out of New York City. They are to be built jointly by the General Electric Company and the American Locomotive Company. Provision has been made for either third rail or overhead current collection. Specifications for the switching locomotives provide for handling a 1,500-ton trailing train consisting of 75 per cent empties and the balance loaded cars at a speed of not less than 25



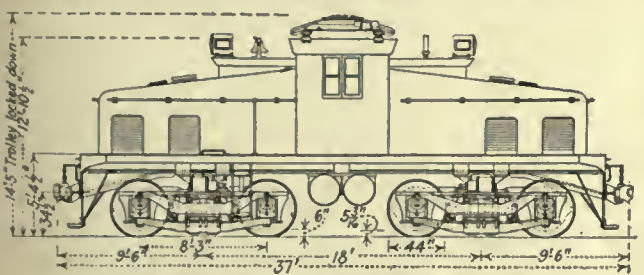
The Road Freight Locomotives Resemble Those Now Used in Passenger Service

m.p.h. The road locomotives will handle a 3,000-ton train of the same general make-up at speeds of not less than 32 m.p.h.

The switching locomotive is of the steeple cab type carrying two equalized swiveling trucks equipped with four GE-286, 600-volt motors. The outline of the locomotive and the general arrangement of the apparatus in the cab are shown in accompanying illustrations. The nominal continuous rating of this locomotive is 1,240 hp., or approximately 310 hp. per motor. A 72:17 gear ratio is used with the cushion gear, of the type in service on the Paulista locomotives, described in *ELECTRIC RAILWAY JOURNAL* for June 11, 1921, and is being used also on the Mexican Railway locomotives, described in this paper Dec. 8, 1923.

To insure ample strength for this character of service the cab platform consists of an integral steel casting. A master controller is provided at the engineer's position on each side of the cab and the control and auxiliary apparatus is installed under the hoods of the sloping end cabs.

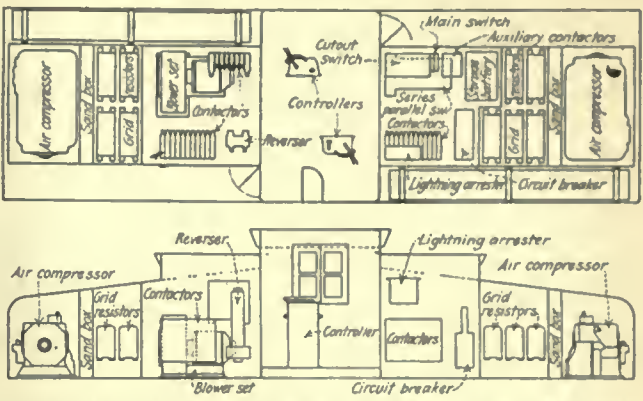
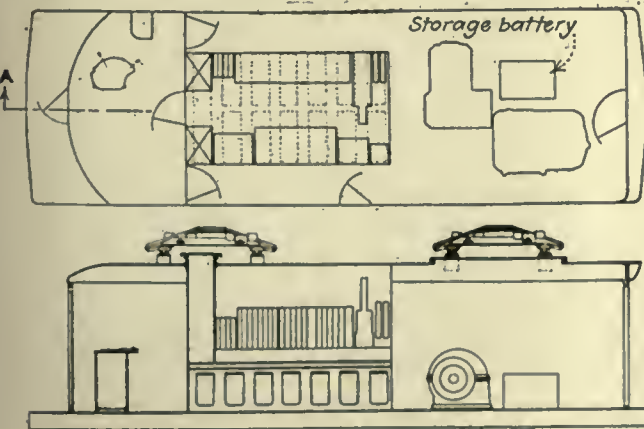
Control is type PCL, with air-operated switches energized from a 32-volt storage battery. In addition to



The Switching Locomotive Is of the Steeple Cab Type

operating all control circuits the 32-volt supply is also used for cab lighting and for headlights. Remote control is used for all accessories, including blower motor circuits, compressors and reversers. A high-speed overload circuit breaker is connected in the high side of the main supply. Additional protection against injury to the individual motors is provided by overload relays in each motor circuit, so arranged that a short circuit on an individual motor will trip out the high speed breaker. The battery is charged by being connected in series with the blower motor. To protect against overcharging, a bypass resistance is used in parallel with the battery, thus reducing the charging current. The use of this resistance is controlled by an ampere-hour meter.

The master controller is of the standard design. It has a main operating handle, a reverse handle and a



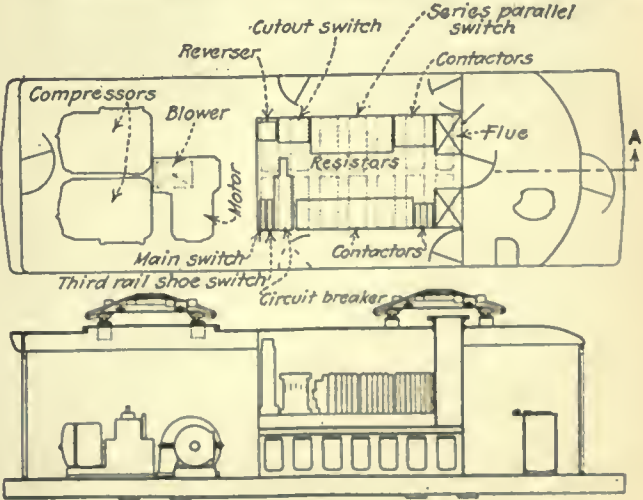
Control and Auxiliary Apparatus Is Installed in the End Cabs

reduced field handle. Three full running speeds are provided with the motors in series, series-parallel and parallel. In addition, two reduced field steps may be used with each motor arrangement, giving a total of nine free running speeds. Air brakes are of Westinghouse type 14 EL, combined straight and automatic. Two CP-26 compressors provide a total of 200 cu.ft. displacement at 130 lb. pressure. Other accessories include a motor-driven blower located in the end cab for ventilating the traction motors, a bell and a whistle mounted on the roof and suitable equipment of air-operated sanders.

ROAD FREIGHT LOCOMOTIVES

Running gear for the road freight locomotives, like that of the two switching locomotives, is coupled by an articulated joint. Motor and control equipment duplicates that used on the switchers. The design of this locomotive is shown on accompanying drawings. A gear ratio of 69:20 permits a maximum speed of 60 m.p.h. Two compressors giving a total displacement of 300 cu.ft. of free air at 130 lb. pressure will be installed:

Two box type cabs are provided, carried on cast platforms similar to those used in the switchers. These will be somewhat similar in appearance to the present passenger locomotives, having rounded ends. There will be a high-speed circuit breaker installed in each cab protecting each half unit independently of the other. Pantographs are of the hornless design operating through a range of 25 in. Two are mounted on each cab. In order to operate over the present electric division and such portion of the West Side tracks as



Section A-A

Arrangement of Equipment on Road Freight Locomotive

may be equipped with third rail, contact shoes are provided on both sides of each truck.

One of the novel details is the provision of forced grease lubrication for the pins in the spring rigging. All locomotives will be equipped with solid rolled steel

carries a jack and in case of emergency there are therefore a considerable number of jacks available at the scene of trouble. Many blockades, particularly during snow storms, have been relieved before the arrival of the wrecking car.

PRINCIPAL DIMENSIONS OF LATEST NEW YORK CENTRAL ELECTRIC LOCOMOTIVES			
	Road		Switcher
Length.....	67 ft. 4 in.		37 ft. 0 in.
Height (over trolley locked down).....	14 ft. 5 in.		14 ft. 5 in.
Wheel base.....	53 ft. 9 in.		26 ft. 3 in.
Rigid wheel base.....	8 ft. 3 in.		8 ft. 3 in.
Maximum safe speed m.p.h.....	60		40
Gage.....	4 ft. 8½ in.		4 ft. 8½ in.

wheels in accordance with the railroad's specifications. The principal dimensions are given in the accompanying table. A delivery of approximately 12 months is promised for this order.

Emergency Tool Boxes at Strategic Points to Relieve Blockades

THE Union Street Railway, New Bedford, Mass., has placed 12 emergency tool boxes at strategic points along its lines. Each case contains one large and one small Barrett jack, two jack handles, two sets of jumping irons, four blocks of wood, two crowbars, two kerosene



Emergency Case Contains Tools Useful in Cnse of Accident or Blockade

lanterns, one fireman's axe, and 8 ft. of ¾-in. chain, with a large iron hook at the end. Each of these articles is numbered to correspond with the number on the emergency box.

Motormen and conductors are not allowed to use these tools except when human life is in danger. In such cases entrance to the box may be had by breaking the glass in the door and lifting the latch. All officials of the railway and inspectors, however, carry keys to these tool boxes, and are permitted to use the tools to replace derailed cars or relieve blockades. Every railway car

The Readers' Forum

Comment on Foreign Report MANCHESTER CORPORATION TRAMWAYS

MANCHESTER, ENGLAND, Jan. 2, 1925.

I think the first of my New Year resolutions shall be to reply to your letter of Nov. 11 last, in which matter I have been most neglectful. Perhaps my reason was mainly that you gave me so much excellent matter to peruse but left me so little to criticise.

I need hardly say I have read your report* with the utmost interest, as, naturally, the views of another expert, and particularly one with such a wide experience as yourself and your party, very much interests us, though I think, perhaps, you have been unnecessarily kind in your observations. Let me, however, sincerely congratulate you on your receptivity of the atmosphere of traffic matters in this country and your grasp of the British point of view and interests.

The first paragraph of your introductory remarks, where you instance how little in general principles either country can show the other, is a true commentary on the situation that the necessities of each are vitally different, nevertheless we can each learn from the other innumerable items of detail and operation which cannot be other than beneficial.

Perhaps the outstanding difference in the general operation of our respective services is that which you indicate as to the standard of maintenance prevailing in this country as compared with your own. This aspect struck me when visiting the States and appears to be somewhat the outcome of our respective mentalities. The Britisher likes a solid, substantial, permanent job and devotes unstinted efforts to maintain that which he has in a state of efficiency probably long past its economic utility. On the other hand, it seems to be the temperament in the United States to use a thing to the utmost and then discard it outright, substituting probably a newer and more effective instrument. Our system perhaps gives a better sense of comfort and well-being all along the line; yours, a more alert and up-to-date result for the newer parts of your concerns and perhaps shows up the older by comparison to a greater extent.

You invite critical comment of your report, but as I have previously stated, you are too meticulously accurate to afford this opportunity and your report is most valuable as being an outsider's survey without bias or predilection on the operations of our various passenger transport activities.

My chairman (Alderman James Bowes) desires to associate with me in kindest regards and the best of good wishes for the New Year.

HENRY MATTINSON,
General Manager and Chief Engineer.

*Report of Committee on Foreign Operations of the American Electric Railway Association, published in ELECTRIC RAILWAY JOURNAL, Sept. 20, 1924.

Equipment Maintenance Notes

Spring Support for Portable Drill

THE accompanying illustration shows an "old man" with spring support for a Chicago Pneumatic drill as used in the 39th Street shop of the New York Rapid Transit Corporation, Brooklyn, N. Y. The bracket is clamped to the work in the usual



Pneumatic Drill with Spring Support Drilling Hole for Motor Suspension

manner. The illustration shows the equipment set up and drilling a hole for a motor suspension. A spring which surrounds the drill and rests on the top of the motor frame holds the portable drill firmly against the top support so that it can be fed down by turning the hand feed in the usual manner. This method of sup-

porting the drill allows the motor to be set up and centered accurately. It removes strain from the workmen and provides an efficient support for heavy drilling operations.

Axle Bearings Held by Dowels

AXLE bearings are held to the axle-bearing caps by two dowel pins placed in the ends of the caps on the cars of the Gary Street Railway, Gary, Ind. These pins fit tightly into holes drilled in the thrust flange of the bearing. The dowels, which have a diameter of $\frac{1}{4}$ in., project $\frac{3}{8}$ in. into the flange. They are of sufficient size to make a drive fit in the cap.

Two jigs are used to facilitate the work of spotting and drilling both the cap and bearing. The one for drilling the holes in the bearing consists of a plate with guide lugs and a stirrup for holding the lining in position. A movable plate containing the two bushed holes for guiding the drill is lowered onto the flange of the lining. For drilling the bearing cap, a jig made from an axle lining is used. The flange of this lining contains two bushed holes for guiding the drill. Small lugs placed on the underside of the lining flange keep it in position during the drilling process. The locations of the dowels in the end of the bearing cap are such that they do not enter the oil chamber of the cap.



Fixtures for Drilling Dowel Pin Holes for Axle Bearings

Cars Numbered Only on Windows

AS THE result of a discussion some time ago among officials of various departments of the Boston Elevated Railway, it was decided to alter the method of displaying the car numbers on the exterior of surface cars. For the purposes of the transportation department it was desired that transparent figures be painted on the car windows to enable inspectors easily to determine the



A Transparent Number Is Displayed in Each of the Four Corner Windows of the Surface Cars of the Boston Elevated Railway

car number after dark. For the purposes of the rolling stock department it was desired to have as few numbers as possible because these always have to be hand painted and the process is expensive. As a solution of the difficulty it was decided to place the car numbers in the upper part of each of the four corner windows.

Black paint, mixed with a small amount of varnish, is applied directly to the inside surface of the window glass. Afterward a coat of white is applied to the entire surface. This produces a transparent white number on a black background. Smaller numbers about 6 in. high are painted on the dashers, but the window numbers are the only ones on the sides of the cars.

Finishing Bearing Faces in Small Planer

BY J. L. REIFF

Machine Shop Foreman Kansas City Railways

WHEN special equipment for the purpose is not available, the joining faces on axle bearing shells may be finished accurately and speedily by using the proper set-up on a small planer. The accompanying illustration shows the method used in the shops of the Kansas City Railways. It will be seen that six half shells are finished at one time.

Curved base blocks are bolted to the bed of the planer. Each block is long enough to take two bearing halves, which are mounted so that the flanges project beyond the ends.



With This Set-up in the Kansas City Shop a Small Planer Is Efficient for Finishing Joining Faces of Axle Bearings

Clamping bolts and bars hold the bearings securely in place. With the arrangement the finished bearings can be removed quickly and a new set applied.

By mounting two tools in the cutting head, the two joining faces are finished simultaneously, reducing the time for doing the work to half.

Hints on Coil Storage

BY A. S. WARNER

Renewal Parts Engineering, Weatlinghouse Electric & Manufacturing Company

THE storage of armature and field coils should receive more attention than the storage of housings, bearings, etc., because coils are more easily affected by improper handling and atmospheric conditions than any other part of a motor.

Armature and field coils are securely wrapped in protecting paper and are shipped in wooden boxes or paper cartons. All coils except the largest sizes of field coils are packed one set in a box.

Some don'ts which should be considered when storing coils follow:

Don't remove the coils from containers in which they are shipped

Dick Prescott Reaches Centerville

And Tries to Ride a Street Car



DICK PRESCOTT and Steve White arrived in Centerville bright and early in the morning. This was the first stop on their trip of inspection, and they looked forward with keen anticipation to their visit to the Centerville Railway shop, where they hoped to get suggestions regarding the organization and duties of a shop engineering department.

Planning to spend two days here, they had made reservations at one of the principal hotels, and intended to take their bags over and have breakfast before starting out to the shop. Being anxious to get a first-hand impression of the service in each city they visited, they decided to take a street car to the hotel.

Not being burdened with much luggage, they did not bother to call a red cap, but packed up their bags and started out from the train platform, looking about to get their bearings among the unfamiliar sights in the lobby.

There was no local railway employee in evidence at the station, and although several car lines passed the front of the building, they were at a loss to know which car to take. Dick ventured to ask a uniformed taxicab starter, who reached for their bags, how to reach the Grand Hotel by street car.

"None of these cars go near the hotel," was the reply. "Taxi here'll take you right over. No charge for extra passengers."

"No thanks," said Dick, and the starter disdainfully let go of his bag. As he and Steve walked out to the corner they were besieged by a string of rival taxi drivers.

"Taxi?"

"Taxi, sir?"

"Right up to the hotels! Taxicab."

"No charge for extras! Taxi right here, sir!"

They kept resolutely ahead until they reached the corner. Steve remained to guard the bags while Dick dodged through a stream of automobiles to ask

the conductor on a car which had stopped at the corner how they might reach the Grand Hotel.

"Does your car go past the Grand Hotel?" asked Dick. "Naw, we don't go that way, that's up town," was the reply he received as the conductor signaled two bells. No wiser than before, Dick motioned Steve to stay with the bags, while he approached the traffic officer in the intersection, working his way through a line of taxicabs and still more automobiles that shot past him, and being sworn at by one of the drivers.

"Grand Hotel?" repeated that busy individual, as he changed the traffic signal, and then glanced at Dick. "Why, that's right up town; one o' them cabs'll take you up there for 50 cents."

"Yes, I know that; thanks," said Dick a little impatiently, "but we'd like to ride over by street car."

The officer again changed the signal for traffic, looked at Dick for a moment and then replied:

"Well, if you want to take a car that goes by the hotel, you'll have to walk up 3 blocks and over one and then wait for a No. 4 car going up the hill. The No. 6 car on this street here goes within 2 blocks of the hotel, but you'll have to get on here and ride around the loop down at the square."

"Thanks very much," said Dick as he turned to rejoin Steve at the corner.

"What luck?" inquired the latter, as Dick again successfully dodged his way through the stream of vehicles.

"Well, if the street car ride to the hotel is worth the trouble of finding the car, it ought to be some ride! Come on, let's try it. We've got plenty of time, anyway, and I want to get all the ideas I can while we're here."

"Thank goodness these bags are light," said Steve, as they stood waiting for the traffic to change in the proper direction. "I wonder if the manager of this property ever tried to ride from the depot to the Grand Hotel on a street car."

until ready to use them. The coils may be identified by the information on the container.

Don't hang coils on pegs or place them loose in bins where they will soon collect dust, dry out and swell. Coils exposed to circulating air will deteriorate more quickly than coils kept in containers.

Don't store coils in a room which is too dry and hot.

Don't store coils in a cellar or other damp place.

Conditions are much less favorable for a long life of winding if dried-out coils are used for rewinding than if the coils become hard and brittle due to overheating from overloads after they are wound in the core.

A dried-out coil is hard to wind, it does not shape up easily, and the insulation will crack under the blows of the mallet. To make such coils more easily wound, they should be heated first in an oven. This softens the black plastic varnish and the shaping can be done more easily with less insulation breaks.

After the coils have been wound without injury and the armature dipped, baked and banded, a coil dried out in service may have a long operating life, provided there is no movement of the coil in the slot.

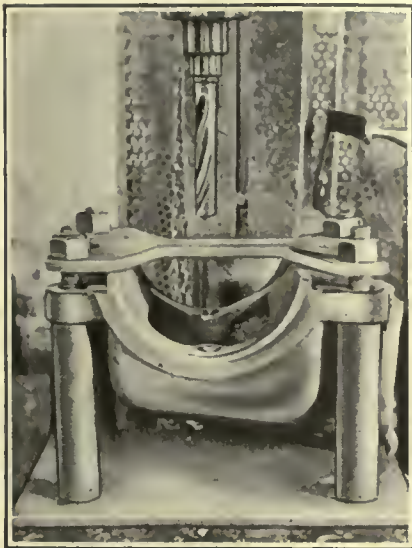
All armature and field coils are insulated with materials which deteriorate rapidly under certain unfavorable conditions of heat and humidity. Even under the most favorable conditions some of the treated materials deteriorate with age. Aside from the deterioration of the material, the coils may be damaged and rendered unfit for use by careless storage and improper handling. The leads of coils that are stored in the original container will be in a better condition for winding and less liable to suffer from dirt and corrosion than those exposed to deteriorating influences.

If proper attention is given to the storage of coils the insulation will be kept in a fresh and pliable condition. This will reduce maintenance costs by permitting maximum life to be obtained from the windings.

Fixture Holds Bearing Cap for Drilling

A FIXTURE for holding an axle bearing cap while the bearing retaining pins are drilled out has been developed in the Wheaton, Ill., shops of the Chicago, Aurora & Elgin Railroad. The fixture consists of a

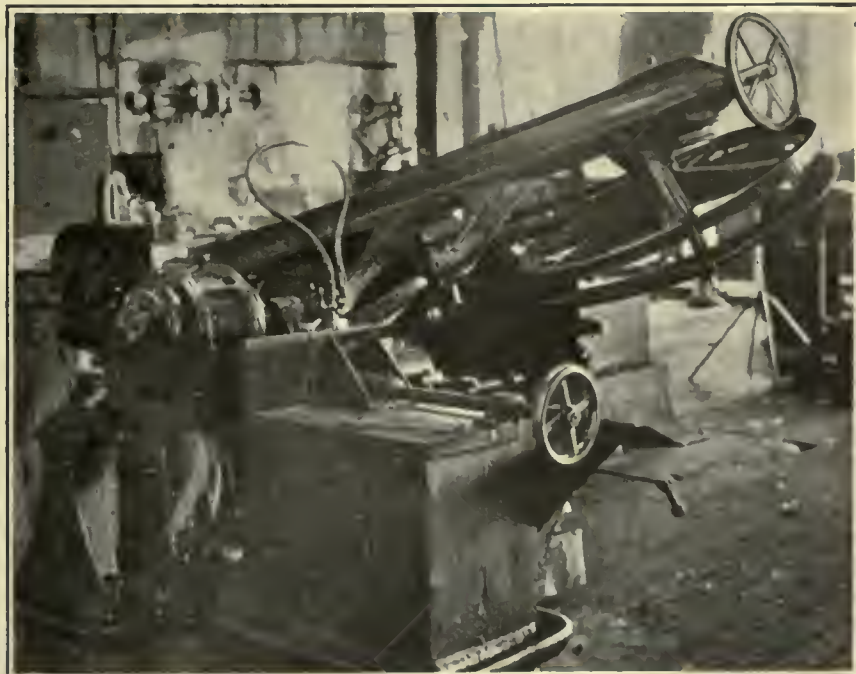
base of $\frac{1}{2}$ -in. steel, approximately 18 in. long by 12 in. wide, at the four corners of which are 2-in. diameter posts, threaded at their upper ends to receive 1-in. nuts. The bearing cap is placed over the four posts as shown in the illustration, being held



The Axle Bearing Cap Is Held In a Fixture While Bearing Retaining Pins Are Drilled Out

in the horizontal position by the shoulders on the posts. It is clamped to the fixture by a top plate and four nuts. The top plate is cut away on the sides to provide clearance for the drill and spindle.

This fixture, which was made in the shops, has facilitated this drilling operation considerably. It requires only a minute or two to set up and the holes are drilled accurately.



Napier Metal-Cutting Band Saw Is Found Fast and Accurate in the Columbus, Ohio, Railway Shops

Band Saw Expedites Metal Cutting

By O. R. HOTT

Columbus Railway, Power & Light Company, Columbus, Ohio

A NAPIER metal-cutting band saw is used in the car repair shops of the Columbus Railway, Power & Light Company, Columbus, Ohio, for the usual cut-off operations ordinarily performed by a reciprocating hack saw. The accuracy and speed of this band saw make it superior to the other type. It is possible to work within 0.005 in. of a perfect cut through a block of metal 10 in. x 10 in. As the blade travels in the cutting direction only, the saw is considerably faster than the reciprocating type.

The band-saw blade is carried in a movable frame on two 2-ft. diameter pulleys mounted on 3-ft. centers. This frame is hinged so that it may be tilted up to receive the piece of work. The frame is counterbalanced so that the blade may be fed by gravity. In its normal position the frame and saw blade are horizontal. The two pulleys are inclined a few degrees from horizontal so as to provide clearance for the work on the return side of the blade.

The saw teeth, on the lower edge of the blade, engage the work midway between the two pulleys. Two sets of small guiding pulleys twist the cutting portion of the blade so that it will be perpendicular to the work. A stream of cutting oil which impinges upon the blade as it

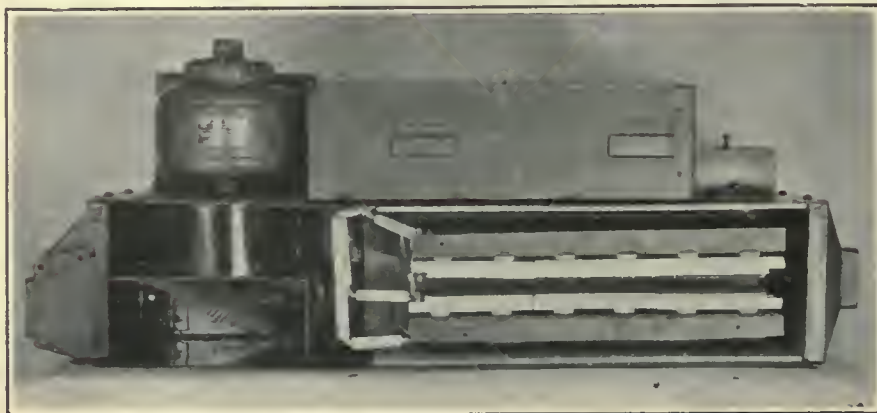
leaves the work washes off the metal particles.

For cutting various materials, several sizes and types of blades are used. Three different tempers are used, and the number of teeth vary from 10 to 24 per in. The pulleys accommodate a 1-in. saw having a thickness of 0.035 inch. These latter dimensions are uniform for all saws. The saw is driven by a 1-hp. motor through spur gears and a bevel gear mounted on the driving pulley.

After the machine has been started it is unnecessary to give it further attention until the cut is finished. Simplicity and speed are features of the saw which have made it valuable in the Columbus shops.

Worn Wheel Flanges Built Up in Detroit

ELECTRIC welding is being used to build up worn flanges of car wheels in the repair shops of the Department of Street Railways, City of Detroit. This procedure is expected to bring about an increase of 20 per cent in the life of the wheels. When flanges are worn to $\frac{3}{8}$ in. thickness or less, the wheels are removed and sent to the repair shop. Here a General Electric continuous-current automatic electric welding machine replaces the worn-out flange metal. A separate driving motor rotates the wheel assembly and the welding operation is continuous and automatic. Two pieces of welding electrode of approximately $\frac{1}{8}$ in. diameter are kept in constant contact with the wheel at different points where the flange needs building up. The wire is supplied automatically from overhead coils, the contact and feed being continuous. The actual welding operation for one wheel is completed in an average time of 1 hour. The rough surface is then refinished on a Norton car wheel grinding machine.

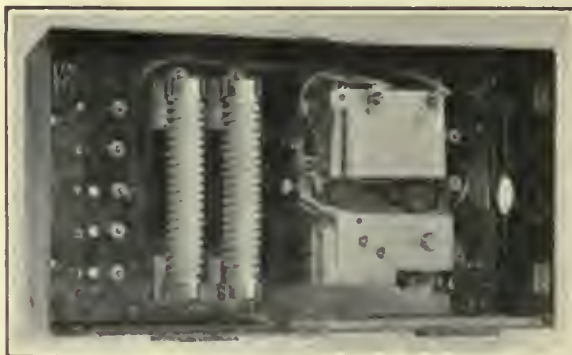


Control Switch and Resistance Mounted as an Integral Part of the Blast Heater

New Equipment Available

Electric Blast Heater

TO REPLACE hot air stoves and to provide for installations where a combined heating and ventilating equipment is desired, the Consolidated Car Heating Company, Albany, N. Y., has brought out an electric hot air heater. A Sirocco fan, motor driven, draws air in at one end of the heater and discharges it over the heating elements, where it passes out at the opposite end. The air inlet has a brass screen, so that foreign material cannot be drawn into the inside of the heater, and a damper is provided so that the air can be taken either from outside the car or inside, or from both if desired. This arrangement permits of a minimum amount of outside air being



Blast Heater With Electric Heating Coils

used in the most severe winter weather and for a maximum at all other times. The unit can be used solely as a ventilating system during weather when no heat is required. An extension handle can be run from the damper handle out toward the front, or up to any convenient location.

The electric heater has four ele-

ments mounted on porcelain blocks side by side. These in turn are supported on sheet iron plates. The blast heater is not only used in passenger cars, but it has proved particularly effective in cars used to transport fruit and other perishable goods in interurban service. With the usual type of electric heaters mounted around the sides of the car there is danger of their being damaged. If crates or boxes are placed close to such heaters circulation is prevented and uniform heating does not result. With the blast type of heater installed overhead, a uniform distribution of heat results.

Electric Tapper

A PORTABLE electric tapper has been added to the line of electric tools manufactured by the Black & Decker Manufacturing Company, Towson, Md. The mechanism in the gearing case is so designed that the tap is driven in at a speed of 350 r.p.m. By a slight backward pull on the machine the tap is automatically reversed and is backed out of the plugged hole at double the speed at which it is driven in. No reversing switch is needed. The machine will tap holes in steel up to $\frac{1}{4}$ in., in cast iron up to $\frac{3}{8}$ in. and in brass or aluminum up to $\frac{1}{2}$ in. The machine weighs 8 $\frac{1}{2}$ lb. and is equipped with a universal motor so that it may be operated on either direct or alternating-current circuits.

Quick Change Electrode Holder

A NEW type of welding electrode holder marketed by the General Electric Company allows the welding operator to make a quick change from the burnt stub to a new electrode. Merely striking the stub end of the old electrode causes it to drop out so that the new wire can be inserted.

The new holder consists of a punched fiber tube with a tinned brass plug inserted in the end. A steel spring rod holds the electrode in place against one of several different sized notches provided for the purpose. The welding cable running to the source of power is soldered to the other end of the holder.

Association News & Discussions

Grade Crossing Hazard Discussed by C.E.R.A.

**Prevention of Highway Accidents a Main Topic at Dayton Convention—
Pick-Up and Delivery Freight Service and Superpower Develop-
ments Complete Two-Day Program**

HIGHWAY safety and prevention of grade crossing accidents, advantages and limitations of pick-up and delivery freight service by electric railways and some of the outstanding factors in superpower development that are of interest to electric railways formed the principal subjects discussed at the annual meeting of the Central Electric Railway Association, held at Dayton, Ohio, on Jan. 8 and 9. Approximately 300 railway and supply members and guests attended the meetings and took part in the well-filled business and social program.

In his annual address, which is printed elsewhere in this issue, President Harry Reid outlined some of the principal developments during the past year and expressed a spirit of optimism and of ever-increasing confidence in the future of electric railways.

Along with these cheerful words, however, came the announcement of the death of S. D. Hutchins of the Westinghouse Traction Brake Company and of James A. Bredt, Cincinnati manager of the Westinghouse Electric & Manufacturing Company, two valued members of the association. Out of respect for their memory those in attendance bowed their heads until the sound of the president's gavel. A memorial to the service and life of each was read by James A. McGowan, chairman of a special committee appointed for the purpose.

CO-OPERATION URGED TO STOP GRADE CROSSING ACCIDENTS

In an address on the prevention of grade crossing and highway accidents by A. E. Makee, president the Ohio Association for Prevention of Grade Crossing and Highway Accidents, a plea was made for co-operation by all of the agencies interested in the conservation of human life and limb and for the use of deliberate and sound judgment in drafting legislation for the relief of present appalling conditions. He cautioned against the adoption of hasty and ill-considered legislation, which would set up arbitrary and ridiculous restrictions and rules that would only result in further disregard for law. Only by that co-operation which is born of a mutual desire to stop the present destruction of life and property, he explained, can an effective step be taken toward the reduction of crossing and highway accidents. In the last analysis these are due to disregard by a very small portion of the motor vehi-

cle drivers for the personal safety and rights of others.

Copies of the proceedings of the conference on grade crossing and highway accidents called by the Governor of Ohio last summer were distributed by Mr. Makee. He said further that the necessity for traffic legislation came from increasing congestion, and that experience and precedent were lacking. He also pointed out that the conditions of future traffic are unknown, and that legislation must therefore be started with sanity and common sense.

Above all other factors, he contended that the most dangerous element in the traffic situation, and the one demanding immediate and decisive action, is that presented by the drunken automobile driver. This hazard to the safety of pedestrians and other users of the highways must be effectively removed, he insisted. Education of drivers was held to be still another important method of reducing accidents. Not much hope was held out for effective results among adults, but the opportunity for work in the schools was considered to constitute a big hope for the future.

CARELESSNESS THE MAIN CAUSE

Practically all grade crossing accidents are the result of carelessness, he said. During the period when steam and electric railroads were originally projected and built the laws were made so as to put the responsibility for accidents on the railroads. With the advent of the automobile, the laws governing its use were made by the automobile men. Consequently, at the present time the pedestrian must look out for himself and must keep out of the way. Common sense and co-operation must accompany the offer to relieve this condition if permanent improvement in conditions is to be made.

According to Mr. Makee, there will always be grade crossings of steam and electric railroads. They can't be eliminated, he said, because new crossings are being put through faster than existing crossings are being removed. He advocated clearing away obstructions so as to give unobstructed view on both the rail line and the highway. This is one step contemplated in the Ohio program. Compulsory insurance as a requisite to the issue of a license is also contemplated, although he admitted that there is a danger from this step, in making the drivers of automobiles feel less personal responsibility.

Physical and mental examination for a license to drive on the highways was also advocated. It was felt that such examinations should be comparatively easy, but that the license also should be easily revocable and hard to reinstate.

A further discussion of the subject of safety regulations at railway grade crossings by Wallace Muir, general attorney Kentucky Traction & Terminal Company, was read by his assistant, Mr. Becker. An abstract appears elsewhere in this issue. George M. O'Connor, claim attorney Detroit United Lines, also read a discussion of the same subject, which is abstracted elsewhere. In introducing his remarks, he said that one of the important elements in the improvement of conditions at railroad-highway crossings was uniformity in the regulations to be adopted by various states. Wide variations in such regulations would lead to confusion and hardship and would make it difficult for tourists visiting several states to avoid violating some of these various laws.

"FULL STOP" LEGISLATION URGED

Charles L. Henry, president Indianapolis & Cincinnati Traction Company, called attention to the recommendation of the recent national conference on grade crossing and highway accident prevention that state legislatures authorize their public utilities commissions to specify those crossings that are considered hazardous and at which all vehicles will be required to make a full stop. He also called attention to the recommendation of the same conference which would require automobiles to slow down to 15 m.p.h. when crossing railroads. This requirement, he said, would at least force the driver to think of what he is doing and would avoid many accidents that are caused by failure on the part of the driver to remember that he is crossing a railroad. Although the first step is to get common sense laws on the statute books, he emphatically pointed out that the next and bigger job is to get behind these laws to see that they are enforced. For this reason he advocated a state constabulary to enforce the highway laws.

Further discussing the subject, J. B. Dugan, secretary Ohio Association for Prevention of Grade Crossing and Highway Accidents, said that it was desired to prepare laws in Ohio which would be in conformity with those adopted in other states. From the proceedings of the Ohio Safety First Conference, he read the proposed measures for reducing grade crossing and highway accidents that were adopted at that meeting.

An important business group which should be interested and made a part of any organization for the reduction of crossing accidents, according to Mr.

Dugan, includes the real estate development companies. They must be interested in this work, he said, in order that they will co-operate to the end of holding down the number of new rail crossings that are put in when new sub-divisions are developed.

J. P. Barnes, president Louisville Railway, outlined briefly the history of the recent Hoover national conference* to reduce traffic accidents. He pointed out how the recommendation for placing the designation of railroad crossings at which vehicles must stop in the hands of the various state public utility commissions had been the means of getting accord between representatives of railroad and automobile interests. He drew a lesson from this incident of the value of frank discussion and honest co-operation, in improving the present appalling conditions. He urged that electric railway men assume personally the responsibility for talking at every opportunity in favor of enforcement of the recommendations of the conference. The question was far above that of a financial problem, he said, and offered an opportunity for an actual service to the American people in improving the present terrible conditions resulting from carelessness and disregard of life.

RESOLUTIONS INDORSE WORK OF HOOVER CONFERENCE

A special committee of the association under the chairmanship of Arthur W. Brady, receiver Union Traction Company of Indiana, had been appointed to review the recommendations of the state committees on prevention of grade crossing and highway accidents. In the absence of Mr. Brady, resolutions indorsing the work of the state conferences and of the national conference held at the call of Mr. Hoover were read by Mr. Barnes.

Whereas at the call of the Governors of Ohio and Indiana, respectively, broadly representative conferences have recently been held in those states for the purpose of ascertaining and recommending practical and effective ways of reducing the awful toll of life, limb and property due to accidents at grade crossings and on the highways, and

Whereas similar conferences of national scope have been held at the call of the National Association of Railway and Utility Commissioners and of the Secretary of Commerce, and

Whereas each of these conferences developed constructive recommendations for the advancement of street and highway safety; now, therefore, be it

Resolved, By the Central Electric Railway Association in annual session convened at Dayton, Ohio, this ninth day of January, 1925, that it heartily commend the National Association of Railway and Utility Commissioners, Governor Donahey of Ohio, Governor Branch of Indiana and Secretary Hoover, for their wisdom, enterprise and keen public spirit as manifested in calling these conferences; and be it further

Resolved, That said association hereby request the electric railway companies, members of the association, to co-operate heartily with all other public and private agencies in carrying out the recommendations of these conferences; and be it further

Resolved, That the said association respectfully and earnestly request the legislatures of the several states within which its member companies operate to give careful consideration to the enactment into law of such of the said recommendations as require legislative action before they may become effective; and be it further

Resolved, That the Central Electric Railway Association hereby pledge its wholehearted support and co-operation to the further development and ultimate adoption

of the constructive and humanitarian program so splendidly begun.

FREIGHT DELIVERY SERVICE

A general discussion of the subject of pick-up and delivery freight service was started by J. P. Longon, auditor Toledo & Indiana Railroad. He said that a pick-up and delivery service which had recently been installed by his company in Toledo was rendered by a large independent transfer company in the city at a charge of 8 cents per 100 lb., with a minimum charge of 25 cents. This charge, however, is effective only in the first zone, which includes an area of approximately 1 mile radius from the center of the business district. Most of the shippers of any importance are located in this area. In a second zone having a radius of 2 miles the rate charged is double that for the first zone, making the cost of pick-up and delivery to the shipper 16 cents per 100 lb., with a minimum charge of 50 cents. A third zone has an approximate radius of 3 miles and the charges are triple those of the first zone. This service in Toledo has just been outlined and the new tariff published. It will be put in as an optional service for shippers in that territory. Previously, free pick-up and delivery had been furnished in some of the smaller communities along the line. The cost of such service, which was absorbed by the railway, varied from 4 to 7 cents per 100 lb. When the free service was put in for these outlying towns the gross revenue from freight increased approximately 18 per cent and two competing truck lines that had been handling most of the l.c.l. freight were ready to sell out. The net revenue from this increase in business went up about 8 per cent, showing that the cost of the pick-up and delivery service which was absorbed by the railway was 10 per cent of the increased gross revenue.

In its tariff the railway assumes the liability for damage to shipments while on the trucks of the trucking company, but its contract with the trucker makes the latter responsible to the railway for all damages to shipments while on the trucks.

Experience with pick-up and delivery service on the lines of the Cincinnati & Dayton Traction Company was outlined by C. M. Byrne, traffic manager. In one case, at a small manufacturing town on the line, a freight business of only a few hundred pounds per month was increased to nearly a million pounds per month by the establishment of a free pick-up and delivery service costing about 5 cents per 100 lb. outbound and 4 cents per 100 lb. inbound. This cost is absorbed by the railway and some of its connecting lines that participate in the revenue.

At another manufacturing town on the line a pick-up and delivery service at a charge of 5 cents per 100 lb. with a minimum charge of 25 cents had yielded little increased revenue because the centrally located industries in the community claim they can handle the shipments at less cost with their own trucks. At the principal shipping point and terminal on the line a pick-up and delivery service has been furnished for some time at 10 cents per 100 lb., with

a minimum charge per shipment of 25 cents. This charge covers territory in some cases 10 miles from the station. The service has resulted in doubling the revenue from outbound freight and trebling that from inbound freight. In these last two cities the charge is added to the freight and paid by the shipper on prepaid shipments or by the consignee on collect shipments. This charge is covered by tariffs and is shown on waybills as advances for drayage. The service assures prompt handling of all shipments and relieves the stations of congestion due to failure of the consignees to take up shipments promptly. Trucks are on hand when the cars are opened and all delivery freight is handled direct from car to truck.

T. H. Stoffel, Westinghouse Electric & Manufacturing Company, described the experiment being conducted in Baltimore after extended investigation by the Interstate Commerce Commission. A charge of 15 cents per 100 lb. is made for the pick-up and delivery service, but after a year of the experiment it has not proved to be particularly successful. An optional pick-up and delivery service that is furnished by the Connecticut Company was also described by the speaker. In this case only about 15 per cent of the shippers use the service, and these are limited to the occasional shippers, the regular and large shippers preferring to use their own truck equipment.

Mr. Stoffel warned against the possibility of discrimination unless the service at all towns on a line is put on the same basis. He said that pick-up and delivery service in a large city is not attractive to the shipper unless all the transportation agencies in the community put in the same service, as otherwise the shipper is required to maintain truck equipment for handling freight over such lines as do not have the pick-up and delivery. Another factor of cost in connection with such service that must be taken into consideration is the clerical work entailed, and Mr. Stoffel maintained that a charge of 8 to 10 cents is not sufficient to cover all of the costs of such service. He expressed the belief that pick-up and delivery would ultimately be made a part of the service of all rail lines, but doubted its advisability until it could be made a universal service.

An outline of the principal phases of superpower development of interest to the railways was given in an address by E. H. Sniffin, manager power department, Westinghouse Electric & Manufacturing Company, and is abstracted elsewhere in this issue.

OFFICERS ELECTED

The nominating committee, consisting of C. L. Henry, H. A. Nicholl and J. A. McGowan, recommended the following for officers and members of the executive committee for the ensuing year, and on motion from the floor they were unanimously elected:

President, F. R. Coates, president Toledo, Ottawa Beach & Northern Railway, Toledo, Ohio.

First vice-president, G. K. Jeffries, Indianapolis, Ind.

Second vice-president, Martin Ackerman, Dayton, Ohio.

*See ELECTRIC RAILWAY JOURNAL, Dec. 20, 1924, page 1042.

Executive Committee: J. P. Barnes, S. W. Greenland, R. I. Todd, A. C. Blinn, H. A. Nicholl, W. S. Rodger, F. W. Coen, J. F. Collins, Myles B. Lambert, James H. Drew, and L. W. Van Bibber.

A dinner, followed by dancing, and

a trip to the McCook government experimental flying field made up the social part of the program. On Friday afternoon the members of the association were entertained at luncheon as the guests of the Ohmer Fare Register Company.

Preventing Grade Crossing and Highway Accidents*

BY WALLACE MUIR

General Attorney Kentucky Traction & Terminal Company

THERE has been an ever increasing loss of life and property resulting from the grade-crossing accident, and unless some action is taken by public officials, by the railways of the country and by the public generally, this tremendous toll will necessarily continue to increase. The desired end cannot be accomplished by the railway companies or by the public generally, acting alone; if anything is to be accomplished it must be the result of a concentrated effort on the part of both the railways and the public. The railways cannot, even were it possible for them to do so, eliminate grade crossings, if the public continues every year to construct nearly twice as many crossings as were eliminated by the railway in the same time.

It seems to me that in order to reduce grade-crossing accidents we must first determine the cause. When we realize that in the United States there are 7,600 people killed and more than 2,000,000 injured every year, as the result of accidents, the situation becomes so appalling as to demand the attention of all the people throughout the length and breadth of this country. As a result of accidents millions of dollars per year are lost in wages and millions of dollars per year are lost in production. It is claimed that of the people killed each year, one-fourth are children under 15 years of age. Such waste of life is an indictment of the citizenship of this country, and particularly of the officials of city, county, state and nation.

Confining ourselves to highway fatalities in the United States, I am informed that in 1923 there were 22,621 persons killed, divided as follows: steam railway crossing accidents, 2,268; street car accidents, 2,006; accidents from other vehicles, 1,559; motorcycle accidents, 336; automobile accidents, 16,452. There were 678,000 injured with an economic loss of \$600,000,000. It is estimated that in 1924 there will be an increase in fatalities of 15 per cent, and in 1925, the number will be 55,000 people killed and 1,500,000 injured. The question is, is there not some way in which we can bring to the attention of the American people this astounding condition? A large number of steam railroads throughout the United States and many electric interurban lines are gradually eliminating grade crossings. In 1923 the railroads in the United States eliminated 1,130 crossings at an approximate cost of \$70,000,000, but during the same time

local authorities established 3,554 new grade crossings. At this rate it will be readily seen that the grade crossing can never be eliminated, if the counties and states continue to exercise their right to build and construct grade crossings instead of prohibiting the construction of such crossings. But I do not believe the elimination of the grade crossing will stop the sacrifice of human lives and loss of property, for we are told that even where the grade crossing has been eliminated by viaduct or underground passages the reckless automobile driver, heedless and blind to danger, a devil of speed and a slave to recklessness, continues to kill and maim by wrecks at such points.

The engineer who pulls a train is a man of mature years, sober and discreet, who has had years of experience and is constantly under the supervision of superior officers, and he knows that one act of forgetfulness will cause him to lose his position. The operator of the interurban electric car is of the same character. He reaches this position by intensive training and careful inspection, and the train, whether steam or electric, is confined to two

rails and is bound to stay upon its own side and upon its own right-of-way. It does not dart from side to side and cannot be compared to the high-powered automobile from the standpoint of danger.

Whenever the law of our country is such as to require sufficient training on the part of the automobile driver before he is permitted to drive, and when laws are rigidly enforced as to his conduct in the operation of the automobile, we will then, and not until then, reduce grade-crossing and other highway accidents.

If one who is permitted to drive an automobile under a license knew that he would forfeit this right as a result of misconduct on his part, he would be much more careful in the operation of his automobile. If parents could be held responsible for the use of the family car by the minor, in some way other than in damages, this class of accidents would be greatly reduced if not eliminated.

In conclusion, I give for your consideration in the elimination of the grade-crossing accidents this one thought: Take such steps as are necessary to control the driver and the user of the automobile. If it can be done by legislation, then let's legislate; if it can be done by arousing a public opinion to the proper consideration of the situation, then let's take steps to arouse and incite such a public opinion. If it is necessary to take drastic steps, such as the forfeiture of the right to drive an automobile, forfeiture of the automobile itself, requiring the "stop, look and listen rule," imputing the negligence of the driver to all occupants of the machine, and any other such drastic measure which will be helpful in the saving of human lives, then let's take such steps.

Increasing Confidence in Electric Railway Future*

BY HARRY REID

President Central Electric Railway Association

THE past year has developed an ever-increasing confidence in the future of electric railways, and much of the uncertainty which has existed for several years past is giving way to a feeling of optimism, which is evidenced by improvements which have recently been made or are under way in the various branches of service rendered.

It is realized more fully than ever before that a large part of the local or short-haul travel, which formerly meant so much to operating revenues, has been lost to the motor vehicle, both privately owned and public, and that if passenger income is to be maintained or increased, it must be done through intensive development of the longer haul travel. The public is demanding, and is willing to pay for, faster and more comfortable transportation, and to meet this requirement a number of our lines have found it necessary to revert to the heavier and easier riding type of rolling stock and provide a so-called de luxe service, including parlor, dining and sleeping cars, and I believe results as a rule have been very satisfactory.

I understand parlor or chair cars, with an extra charge for the service, are being operated on at least five of our member lines, and that four or five others are preparing to furnish such service. Other improvements resulting in operating economies which are being provided are modern motive power and automatic substations, in both interurban and major city operation.

Material progress is being made in the standardization of freight rolling stock, accounting, operation and methods, through the efforts of the various subsidiary associations. This is particularly true of the Traffic Association, which during the past year has perfected the details and agreements necessary for the publication of a joint through passenger fare basic tariff covering practically the entire territory traversed by Central Electric Railway Association lines. Joint through rates and divisions have been established with both electric and steam

*Abstract of discussion before the Central Electric Railway Association, Dayton, Ohio, Jan. 8-9, 1925.

*Address before annual meeting of the Central Electric Railway Association, Dayton, Ohio, Jan. 8-9, 1925.

lines, to and from much additional territory, thereby increasing materially the scope of operations and making available to electric lines a much greater volume of tonnage, and at the same time enlarging the markets of shippers because of the superior service rendered.

Substantial improvements have also been made in freight station and terminal facilities, such for example as the Indianapolis terminal, and I believe others are under way or projected at such important points as Cleveland, Detroit, Fort Wayne, etc., all of which will no doubt result in material increases in volume of tonnage and economies in operation. There has been an appreciable increase in the number of freight cars in service of a more standardized design, making possible a freer interchange of equipment, and thereby expediting the movement of freight and resulting in substantial savings in cost of handling.

A matter of much importance to the industry is the better understanding which the public generally now has of the problems and difficulties of the electric railways, brought about by the educational efforts and the public relations activities of the various properties. It is becoming increasingly evident to the public that the electric railway is the backbone of the prosperity and growth of their communities. As a result, civic authorities and regulatory bodies are co-operating to a greater extent than ever before in the solving of transportation problems.

One of the most serious problems confronting the electric railway industry today is the unfair competition of the motor vehicle, which in many localities is unregulated and operated by irresponsible parties, taking the cream of the traffic in territory which electric railways have built up through many years of effort.

It is generally conceded that the motor bus and truck have an important place in the transportation of the country, in serving communities and districts isolated from rail lines, as feeders to rail lines, and also that they can be made an efficient auxiliary to existing electric railways, when service is properly co-ordinated. But the unregulated motor vehicle is destructive alike to public welfare and the prosperity of electric railways. It is the general opinion, which has been amply demonstrated, that electric railway operators, with their knowledge and experience in the transportation business, are best qualified to meet the transportation requirements of the public, and that bus operation in the territory served by their lines, and where there is need for such service, should be supplied exclusively by them. Realizing that the public can best be served by providing the type of transportation best suited to the demands, and as a means of conserving revenues, many of our member lines have provided auxiliary bus service. However, in order further to protect our interests and investments, and in order that the public may have safe, reliable and satisfactory transportation service, it would seem necessary that electric railways forestall as much as possible the encroachment of independent bus operators in their territories, by themselves

providing the service demanded by the public. At the same time such steps as may be necessary should be taken to secure necessary legislation providing for proper bus and truck regulation,

under the jurisdiction of the same authorities governing the operation of rail lines, with a provision requiring a certificate of convenience and necessity in each case.

Superpower and the Railways*

By E. H. SNIFFIN

Manager Power Department, Westinghouse Electric & Manufacturing Company

A DOZEN years ago I advocated that the railways should take their power from the central station. Most of them have by this time adopted that policy, and found the advantage of it. What, then, is the interest of railway men today in this question of power, and more particularly in the superpower phase of the subject? Superpower does not mean local interconnection of existing systems, but the establishing of great power zones, themselves interconnected, using 220,000-volt trunk transmission lines. You are interested, for you are large users of power. The populations of our most congested districts use for their transportation from 30 to 40 per cent of their total energy consumption. Even in the less populous districts the power for traction service averages around 20 per cent. I find, too, that of your total operating costs, power constitutes something like 15 to 17 per cent. So I take it you are interested in any movement that will tend to improve the availability and the cost of this indispensable commodity. Moreover, the importance of this question reaches to every inhabitant of the country.

If you will permit me to exaggerate a little bit—and not so very much either—I venture the assertion that our position today, relative to what we can do, compares, in its state of undevelopment, to the place we occupied in 1885 when direct current was the only system of transmission we knew. Do you realize that electric service today is touching only about 65 per cent of our population; that only about one-third of our homes use it, and that inefficient isolated plants still aggregate as much total power as all the central station plants combined? Power generation as we conduct it today is taking about twice the coal it should. If all this power were developed with the efficiency of our best existing central stations, it would save about 150,000,000 tons of coal per annum and perhaps the labor of half a million people. Is it not impressive to know that more than 80 per cent of the potential water power of the United States still remains undeveloped—more undeveloped water power than all the power we are using today?

Can any one doubt that the steam locomotive must sooner or later go the way of the horse? The railroads use today about as much coal in their locomotives as all the industrial plants of the country combined. Much of this coal can be saved; but more important still, the railroads will have to be electrified to meet the country's growing transportation requirements.

So we can see clearly what lies ahead

of us. We have got to utilize every available source of power that we possess, and bring this power to every one everywhere. And that is what we mean by superpower. Many power developments not considered heretofore feasible because of an inadequate market would be entirely practical as part of a comprehensive system. You cannot run trolley cars through some sections of the country, because it wouldn't pay. For the same reason it has not been possible to run transmission lines to many places where they would have been a great blessing, but in my opinion there is enough saving possible in our present methods of operation to enable us to extend the benefits of electric service to the tillers of the soil, and I think the idea will not reach its full fruition until we do.

The public has heard about superpower and is interested. It does challenge the imagination, even of the layman. Articles are written about it and the politicians are listening. A recent candidate for the Presidency stood openly for the government ownership of public utilities. Governor Smith of New York thinks the water powers of that state belong exclusively to its own citizens. Maine has a law prohibiting the export of its hydro-electric power. Governor Hunt of Arizona was recently re-elected on the issue of whether Arizona would join the seven-state agreement concerning the power development of the Colorado River. Six other states had consented, but Hunt opposed it. If a state intends to confine the use of its water power within its own borders it might just as well cut off its railroads and its telephone and telegraph lines at the border, and its highways. I do not suppose there is any provision in our federal constitution that has conferred more benefit on the country than the clause which provides for free trade and free intercourse between the several states.

But there's a still more important phase of this subject—one that you have heard before, and will hear more of, and one that comes pretty close to your own interest. That is the question of government ownership. That question has not yet become a dominating issue which the power people have had to meet. It is in the air, and as the public imagination comes to grasp more clearly the economic elements of a general power supply, the very fact of this greater public interest will naturally incite political agitation.

There are today in this country more than 1,000 municipally operated electric power plants. Most of them are small and aggregate a meager portion of the total central station capacity. They do, however, constitute about 20 per cent of the total number of central stations. A few of them, where they are

*Address before annual meeting of the Central Electric Railway Association, Dayton, Ohio, Jan. 8-9, 1925.

large in size and of modern design, are efficient plants. Most of them are economically indefensible. They constitute less than 4 per cent of our total central station capacity. Within the past 5 years more than 800 of these small municipal plants have gone over to private ownership. The greater part of these plants have owed their existence to the mass emotion that political appeal so easily excites when it champions the people against the corporation. If the corporation can make money in serving the public, why should not the people save that money, that profit, and supply their own service at cost? Why not, indeed, if they can reach the same cost?

The public debt of the country—federal, state, county and municipal—is about \$35,000,000,000. This debt would be more than doubled if the government took over all the utilities. Also the present per capita tax of nearly \$100 which we now require for the cost of government would be greatly increased. The proponents of the public ownership idea argue that the government could raise the money at less cost by the issuing of tax-free bonds. True, but where would the money come from which private ownership now pays to the government in taxes, some \$665,-

000,000? Government must go on. The people must support it in one way or another. So increased taxes would have to supply the deficit.

Now, gentlemen, we have forged ahead under the rule of private initiative, the law of the survival of the fittest. The public must be protected both as customers and owners of our utility companies. They are protected by government control and regulation. But government operation has never proved its case, either in theory or practice.

We have already made a good beginning with superpower. Such a system already stretches 600 miles across the Southeastern states, representing the co-operation of seven different companies. California is wired up practically continuously throughout its length. In other sections of the country other systems are taking form. Presently a few great systems will cover the whole United States. Ultimately we shall have a system of universal power supply. We must have it, for it seems to be the one agency with which we can meet our increasingly difficult economic conditions. Its fullest national development is an indispensable element in our future prosperity and happiness.

Uniform Traffic Laws Proposed*

By GEORGE M. O'CONNOR

Claim Attorney Detroit United Lines, Detroit, Mich.

WE ARE, of course, chiefly concerned over the grade crossing situation as it confronts the interurban electric railways, and the seriousness of our problem can best be appreciated by realizing that there are today some 200,000 level grade crossings along the interurban routes. Through municipal development and annexation, these are increasing at the rate of 2,000 per year. Separation of these grades will cost on an average of \$10,000 each, necessitating a total expenditure of \$2,000,000,000. The interest alone on this sum of money at 5 per cent amounts to \$271,000 per day, so that the financial impossibility of speedily undertaking the work and keeping pace with it is evident.

Available statistics show that of all accidents, automobiles are involved in more than 75 per cent. Observations taken in 1924 of 306,000 motor drivers approaching railway crossings showed that less than 3 per cent brought their vehicles to a stop. Some 20 per cent looked in both directions, the same number looked one way, and the balance trusted to luck, stepped on the gas and went across.

Accidents arise principally from three causes, namely, incompetency, recklessness and carelessness.

Not all persons are qualified to drive motor vehicles even though they have a knowledge of the laws governing traffic on the highways and are familiar with the workings of a motor vehicle, and the experience of many electric railway companies in their labor employment departments is that but one man out of three can qualify as a

motorman. Yet the state will issue a license to drive an automobile without question; the defects which would disqualify the motorman are not considered by the license issuing officer. This can and should be prevented.

You will ask me then how we are to stop accidents. I can answer this by saying that as soon as chickens learn how to cross the street they will stop being killed, as I believe that many motorists employ the same amount of brain power when crossing railroad tracks that chickens do when crossing the road in front of moving automobiles. Then you will ask how we may reduce accidents; this I can answer more easily.

Educate the people, commencing in public schools, following it through all societies that are engaged in accident prevention, and especially interest the daily newspapers, which should be vitally concerned in giving the information impartially and fairly; then if the motorist does not learn or does not care to learn, have each state of the Union follow its sister states Mississippi, Virginia, Tennessee, Montana and North Carolina, in which states they have well defined "Stop Laws" with penalties, and grade crossing accidents are nearly nil.

I suggest and urge that the public utilities officials of each state adopt as soon as possible the following uniform traffic laws:

1. Make it a penalty for any motor vehicle to cross railway tracks without coming to a full stop.

2. Adopt a universal and distinctive color scheme for lights at railway-highway crossings so that there can be no confusion as to what these lights mean.

3. Make crossing warnings universal as to design.

4. Prohibit the use by others of anything in the slightest indicative of railway crossing warnings, both in the form of stationary signals and whistles.

5. Prohibit all other signs or lights within a specific distance of crossings.

6. Require a rigid test, both physical and mental, of all applicants before granting of motor driver's license.

7. Prohibit the use of red lights on the rear of all motor vehicles except for stop signs and that a universal and distinctive rear light of some other color be used.

New York Electric Railway Association

THE midwinter meeting of the New York Electric Railway Association will be held at the Hotel Commodore, New York, on Thursday, Jan. 22. The morning session will begin at 10 o'clock. There will also be an afternoon session. A banquet will be held at the Commodore in the evening. The two speakers at the dinner will be Clifford E. Paige, vice-president Brooklyn Union Gas Company, whose subject will be "A Changing Public Sentiment," and Dr. Warren W. Giles, who will speak on "Personality — the Business Man's Greatest Asset."

A list of the papers and discussions at the two sessions follows:

"High-Voltage Insulators and Their Relation to Radio, as Affecting Railways," by G. B. Smith, engineer Ohio Brass Company.

"Modernizing Fare Collection," by P. O. Lund, Eastern representative Johnson Fare Box Company.

"Interurban One-Man Operation, Tangerine Line," by J. M. Bosenbury, superintendent motive power and equipment Illinois Traction System, Springfield, Ill. The discussion on this paper, with illustrations, will be led by George L. Kippenberger, assistant general manager St. Louis Car Company.

"Light-Weight Interurban Cars," by W. J. Clardy, general engineer Westinghouse Electric & Manufacturing Company.

"Recent Developments in the Field of Gas-Electric Buses," by J. C. Thirlwall, railway engineering department, General Electric Company. The discussion on this paper will be led by J. A. Queeney, president Philadelphia Rural Transit Company.

"Freight Traffic—Its Source and Development," by Fred W. Brown, general superintendent Michigan Railroad, Grand Rapids, Mich.

"Essentials of Discipline," by F. S. Macy, physician in charge, Medical Bureau, Brooklyn-Manhattan Transit Corporation.

A report of the proceedings of the Accountants' committee will be presented by E. H. Reed, auditor Brooklyn City Railroad.

Indiana Utility Convention

A ONE-DAY meeting of the Indiana Public Utility Association will be held in Indianapolis on Jan. 22. The meeting will be held along with that of the Indiana Sanitary and Water Supply Association, separate sessions being held in the morning with a joint luncheon, a joint program in the afternoon and a joint banquet in the evening.

Among the speakers will be William

*Abstract of a discussion before the Central Electric Railway Association, Dayton, Ohio, Jan. 8-9, 1925.

H. Hodge, president Public Utilities Advertising Association, who will discuss the uses of advertising by public utilities; General George H. Harries, who will speak on "Our Obligations As Citizens," and W. S. Vivian of Chicago, who will discuss "Public Relations." Harry Reid, president Interstate Public Service Company, has called meetings of the managers and members of the Women's Public Information Committee at the same time.

"Transportation Night" in New York

SAFETY and transportation were the subjects discussed at the third regular meeting of the Metropolitan Section held in New York, Jan. 9. Difficulties in schedule making for a three-track elevated railroad where express and local trains running in one direction on two tracks must all operate in the reverse direction on a single track were told by S. D. Smith, superintendent Manhattan Elevated Division, Interborough Rapid Transit Company. To accomplish this every move has been studied and mapped, every motion synchronized and every man instructed how to do his part. Successful operation results from thorough co-operation from top to bottom of the organization. A discussion along these lines was given by D. O'Rourke, trainmaster of the same company.

Safety and public relations was the subject of a paper by T. P. Brannon, Long Island Railroad. He said that last year this railroad carried 92,000,000 passengers on 395 miles of track in "comparative safety." C. E. Hill, safety engineer New York Central Lines, said that 90 per cent of all accidents are due to the human element. Education is the remedy. Safety work was started 12 years ago on this railroad and in the eleven years since it was begun has resulted in saving the lives of 1,450 employees and preventing 57,000 injuries.

Martin Schreiber, manager Southern Division Public Service Railway of New Jersey, spoke about methods of selling transportation. He mentioned in particular four points. First, the rolling stock should be attractive in design and appearance. In the second place one-man operation, where a single trainman is in complete charge of the car, appeals to the public. Third, having a single man on the street in charge of all phases of the operation of a single line is likely to improve the quality of the service on that line. Fourth, advertising is necessary in order to sell transportation.

C. E. Morgan, vice-president and general manager Brooklyn City Railroad, said that from the study of machines industry has turned to the study of men. Time was when, in dealing with men in the mass, leaders of industry failed to consider man as a human factor. Now, however, the employee is looked upon as a co-operative unit with a brain distinguishing him from the inanimate material units which he utilizes in the interest of himself, his employer and of mankind. The objective in personnel work in any industry is to enlist the maximum co-operation and interest of the human element in the success of the undertaking. To

secure the co-operation of your employees you must remember that all are human beings and every effort should be devoted to harmony and co-operation.

Musical selections were heard between the talks and Conrad Young

entertained the audience with a humorous monologue. A. L. Hodges, secretary of the Metropolitan Section, announced that the membership had increased from 726 at the time of the previous meeting to 771 at present.

American Association News

New Headquarters for A.E.R.A.

THE headquarters office of the American Electric Railway Association is to be housed in the Johns-Manville building at 41st Street and Madison Avenue. Negotiations have been completed for engaging the entire 14th floor of this building, comprising 6,000 sq.ft., and the office will be moved some time prior to May 1, possibly as early as March 1. The removal will be announced later. This area compares with some 4,300 sq.-ft. at the present location at 8 West 40th Street, which is quite inadequate for present activities. An exceptionally good rate as prices go today was secured for the new office. The expense for the new space is not much greater than the present rental, which is on a lease taken out several years ago, except as represented by the increase in space. The association was considered to be very fortunate in the arrangements it was able to make.

Codification of Power Failures

THE personnel of the committee of the Engineering Association committee on codification of power failures has now been completed. The membership, as announced by President Clark, is as follows:

W. E. Bryan, superintendent of power United Railways of St. Louis, chairman.

Representing the committee on power generation and conversion: H. T. Connolly, Annapolis, Md.; C. E. Bennett, Atlanta, Ga.

Representing the committee on power transmission and conversion: Adrian Hughes, Jr., Baltimore, Md.; W. J. Quinn, New York, N. Y.; N. R. Love, Denver, Colo.

Purchases and Stores and Stores Accounting

A JOINT meeting of the purchases and stores committee of the Engineering Association and the stores accounting committee of the Accountants' Association was held in New York on Jan. 12 and 13. Methods of co-operating with other purchasing agents' associations were discussed. It is planned to send representatives to Washington for the coming conference concerning the adoption of standardized invoice forms.

After considerable discussion concerning the advantages and disadvantages of a central storeroom, it was the feeling of the committee that such a plan is desirable. Centralized store-keeping arrangements on a number of railways were described, among them

being that of the Philadelphia Company, holding company for the Pittsburgh Railways. It was felt by the committee that it is poor policy to rely on the manufacturer to keep on hand a stock of emergency material. In spite of the expense, it was thought that the railways should keep these supplies in their own storeroom.

Standardization of forms was approved for the purchase requisition, purchase inquiry, purchase order, and some sort of a record of receipt of goods. The committee felt that it would be undesirable to recommend carrying standardization beyond this point at present. Co-ordinating purchases of materials and supplies with the annual budget was discussed. It was decided to recommend that the purchasing agent should notify the budget officer of the company periodically of the total value of purchase orders signed. This notification has been found helpful.

Cleveland was selected as the location of the next meeting, which will be on March 23. The June meeting, for which a definite date has not yet been selected, will be held in Boston.

Those present were: H. H. Lloyd, chairman; J. Y. Bayliss, J. Fleming, C. A. Harris, A. E. Hatton, A. C. Kennedy, P. F. McCall, A. A. Ordway, and F. L. Wheaton of the purchases and stores committee. The stores accounting committee was represented by R. A. Weston and F. E. Wilkin.

Bolt, Nut and Rivet Standardization

A MEETING of the sectional committee of the American Engineering Standards Committee on standardization of bolts, nuts and rivet proportions was held in New York City on Jan. 8. Reports of various sub-committees included standard sizes of small rivets; sizes of tinners', coopers' and belt rivets; sizes of wrench head bolts and nuts, and wrench openings; sizes of slotted heads for machines and wood screws; sizes for track bolts, plow bolts and carriage bolts. The various dimensions proposed by the sub-committees were discussed and changes and revisions were made. After the tables have been corrected the reports will be printed and circularized for criticism.

A report was presented of an informal conference with foreign representatives of standardization bodies held on Oct. 28, by the staff of the American Engineering Standards Committee. Suggestions resulting from this conference were considered and a resolution was passed to provide for co-operation with all foreign standardization bodies.

The News of the Industry

Amendment to Ohio Bus Law Is Sought

An amendment to the Freeman-Collister law, giving the State Public Utilities Commission control of motor bus transportation in the state, has been introduced into the General Assembly of Ohio now in session.

This amendment specifically takes out of control of the state commission buses operating wholly within municipalities and contiguous territory. The amendment was drawn to meet the needs of Cleveland, where the Cleveland Railway has been threatened with motor bus competition. It has the backing and support of legislators from all the larger cities of the state.

The amendment introduced into the Senate has already been favorably acted upon by the Senate automotive committee and will be voted on by the Senate during the week ended Jan. 24. Political leaders appear confident that the measure will pass. A similar amendment is also pending in the House.

Passage of the amendment by the General Assembly would prevent issue of a certificate of convenience and necessity by the State Public Utilities Commission to the outside motor bus interests which have been trying to get bus rights in Cleveland.

John J. Stanley, president, has publicly announced that the Cleveland Railway is willing to operate buses in Cleveland in accordance with the terms of the service-at-cost plan under which cars are operated in Cleveland.

Flexible Rates Will Be Recommended for Atlanta

Establishment of a flexible car fare in Atlanta, in accordance with the recommendations of the John A. Beeler Organization, will be suggested by the traction committee of the City Council at its next meeting and will probably be adopted by the street railway department of the Georgia Railway & Power Company. The schedule recommended will be "Schedule D," which provides for 10-cent cash fares, tickets four for 25 cents and a 5-cent fare for all school children under 12 years.

Should this schedule fail to check the losses sustained by the railway, and should the cost of service in the next 2 years exceed the gross revenue of the railway by 20 per cent, "Schedule E" would automatically become effective. This provides a 10-cent cash fare, tickets four for 25 cents, transfers given with cash fares only, and a 5-cent fare for school children under 12 years of age. If, on the other hand, the revenues of the department should show a sufficient increase, "Schedule C" would be put into effect. This makes cash fares 5 cents each, with free transfers, no tickets sold to adults, and tickets

sold to school children at the rate of three for 10 cents.

The maximum charge provided in the schedule—"Schedule H"—consists of 10 cents cash fare, no tickets sold, free transfers, and 5 cents fare for school children. The minimum charge—"Schedule A"—consists of a 5-cent cash rate, tickets six for 25 cents, free transfers, children's tickets three for 10 cents.

It is pointed out that while the cash rates for adults is 10 cents under the new schedule, this is more than counterbalanced by the 5-cent rate for school children, making the actual cost of carfare per family smaller than at the present time. It is recommended by the Beeler Organization that jitneys be entirely eliminated from the streets of Atlanta.

Thompson Hampers Mayor Dever's Purchase Plan

Former Chicago Mayor Appears in the Role of the Man with Monkey Wrench in an Effort to Discredit His Successor's Municipal Ownership Aspirations

POLITICS, the specter which Mayor Dever has been fighting for months, finally has taken a good grip on the Chicago \$450,000,000 transportation issue. As a result the Mayor, with his local traction chairman, Alderman Schwartz, has conceded defeat in his plan for a February referendum on municipal ownership. With this concession, Major R. F. Kelker, Jr., and his associates in the appraisal of the Chicago Surface Lines have pocketed the figures they had ready for the aldermanic committee and are quietly working out many details of the valuation which were slurred over in the first hasty summing up.

It was former Mayor William Hale Thompson, warm friend of Mayor Hylan, who began making a football out of the Mayor's plans. Discredited by a landslide vote two years ago at the end of a scandalous administration, Thompson has assembled part of his old machine and has announced a slate of Aldermen in about half of Chicago's wards, all running on platforms opposed to municipal ownership.

Other political complications followed. A Republican member of the traction committee accused Mayor Dever of forcing the committee Republicans to neglect campaigning so that Democrats could get busy and take away their wards. Finally Alderman Nelson, a labor mouthpiece and a Thompson candidate, saw Corporation Counsel Busch talking privately and separately to three Dever Aldermen.

"The corporation counsel is here lobbying among the members," Nelson said significantly to Mayor Dever.

"That's untrue," shouted the corporation counsel. "If I were elsewhere, I'd say it stronger."

Nelson, committed to Thompson's old 5-cent fare plank, wanted to know whether the proposed Municipal Railway Board could raise and lower fares.

"Yes, raise or lower them," Chairman Schwartz said.

"Never mind the lowering," retorted

Nelson. "That board will be right on the job to increase fares to care for the certificate holders."

Other Aldermen, quiet during the first part of the ordinance reading, broke out vociferously when Chairman Schwartz came to the section bearing the \$45,000 a-year plum of the Municipal Railway Board appointments. This probably will be around \$125,000 a year when the tentative salary of \$5,000 a year each for the board members is finally raised to a fitting figure.

Alderman Fick, learning that Council would not have an iota of control over the nine-member board, and that the terms would be nine years, denounced the section as autocratic.

"If these men go wrong," he demanded, "how can the common people understand it wasn't us who put them there? We have got to have the say on the three who represent the city."

"And the recall of all nine," added Alderman Mills.

"And cook up a most palatable political broth," broke in Chairman Schwartz sarcastically. "Every two years, when a bunch of new Aldermen come in, we'll have new board members. Why, it will take these men three years to become effective on the job. Give them a chance without this threat."

"The bankers have to concede us that," said Mills, "to protect their surface lines securities due in 1927."

DIFFICULTIES AUGMENTED

Nothing was settled, except that the committee recognized the irony of a suggestion from Alderman McKinlay, representing the exclusive Beverly Hills district, who said that if the Aldermen couldn't trust the Appellate Court judges to decide the fitness of group C board members, he would have the section changed to read "school board" instead, inasmuch as Council ratifies school board appointments.

The Chicago problem has twice bobbed up politically in the state Capitol at Springfield, once in Governor

Small's inaugural address, paving the way for the Small faction of the Republican party to take the issue away from the Democrats by juggling legislation, and again when wet Democrats from Chicago organized to beat the traction ordinance at the referendum.

The liquor interests took their stand because of Dever's crusades on speak-easies in which he closed 4,000 saloons on court orders. In their desire for revenge the wet representatives will stomp the city, they announced, to upset the vote on the Mayor's project. They overthrew a dry as minority leader and henceforth will have control of minority legislation in the house. It is to these men that Dever will have to go for his special laws to cover the proposed purchase.

Under present conditions the outlook for the referendum is in the April judicial election, although the Mayor said a special election might be called sooner.

TERMS OF THE PURCHASE ORDINANCE SUMMARIZED

An official summary of the ordinance, drawn up by Corporation Counsel Busch and Alderman Schwartz, its authors, was issued recently for publication. It ran to the extent of 38 column inches of newspaper space. The need does not appear to exist for the publication of this summary in full, but a restatement of some of the principal provisions may be of interest. Among other things the ordinance provides:

For the acquisition of the existing street railways and elevated lines by the issuance of municipal railway certificates pursuant to the terms of the 1903 and 1913 acts of the Illinois Legislature. The principal and interest of these certificates are payable solely out of earnings of the railway properties and the proceeds of any sale of the properties so acquired and cannot under the law be paid out of money raised by general taxation.

For the acquisition of the elevated "at a specific amount which can be increased only if the municipal railway board so recommends and the City Council passes an ordinance approving this recommendation and this ordinance is submitted and approved at a referendum."

For the construction of subways out of the traction fund and possibly by special assessment immediately after the passage and approval of the ordinance. The construction of such lines it would appear will depend on the success of the city in its negotiations to purchase the elevated lines, the routes of the new subway being governed by the ability to fit the lines into the general scheme.

For so tying in elevated, surface and subway lines that they will all fit into a comprehensive whole.

For the acquisition of any other local transportation properties or any other means of local transportation, including buses, although not described in the exhibits attached to the ordinance, if the railway board so recommends and the City Council passes an ordinance approving the recommendation and the plan is sanctioned at a referendum.

For a depreciation and renewal fund to come out of the current earnings of the system.

For the segregation of all earnings of the railway lines in a fund separate from all the rest of the city's financial funds.

For a barometer fund to be kept at a fixed percentage of the total amount of the purchase certificates outstanding by changing the rate of fare in accordance with terms still to be written into the present tentative contract. The rate of fare, however, is always to be made sufficient to include a percentage of the earnings for the construction of extensions and the purchase of equipment.

For a municipal railway board to be appointed simultaneously with the issuance of the first certificates, this board to operate all of the local properties controlled by the city, but not to have charge of the construction of subway or elevated lines.

One-Man Cars Approved for Buffalo

Complaint of the City Dismissed by the Public Service Commission—Supplemental Rules Suggested by State Body—Ratio of Accidents to Car-Miles Cut Under One-Man Operation

THE Public Service Commission of New York on Jan. 9 dismissed the complaint of the city of Buffalo against the use of one-man cars by the International Railway in that city. At the same time the commission instructed the company to enforce two supplemental rules for the additional safety of passengers. One rule requires that in no case shall the operator receive fares, collect or count transfers, or make up his trip sheet while a one-man car is in action.

The decision of the commission accompanying the order points out that the investigation of its experts and the testimony presented at the hearings show that the ratio of accidents to car-miles operated has been reduced under one-man operation. In no case, says the decision, were any facts developed by the commission's investigation or presented at the hearing to show that any of the recent serious and fatal accidents in Buffalo were fairly attributable to one-man operation or would have been avoided by two-man operation.

During the period of one-man operation 914 accidents occurred with a service of 1,809,867 car-miles, or 5.05 accidents per 10,000 car-miles. During two-man operation 761 accidents occurred with a service of 1,504,118 car-miles, or 5.06 per 10,000 car-miles.

More than 50 per cent of all accidents were due to collision of electric cars with automobiles, it was brought out. Accidents resulting from other causes than collisions with automobiles have been reduced from 2.51 accidents per 10,000 car-miles under two-man operation to 2.21 accidents per 10,000 car-miles with one-man operation.

The commission points out that one-man operation has resulted in an increase in the number of cars on mid-day schedule from 52 under two-man operation to 69. The maximum number of cars operated under two-man schedule was 111. This number has been increased to 132 cars under the present schedule.

The strict enforcement of the two following rules is directed:

The operator of a one-man car must perform no other work than that of motorman unless the conditions then prevailing permit him to do so with safety. In no case, while a one-man car is in motion, shall the operator receive fares, collect or count transfers or make up his trip sheet.

If the operator leaves the car standing to throw a switch, a signal light, to telephone, or for any other purpose, the air brake must be applied in the emergency position; if standing on a grade, the hand brake must also be set firmly. When he leaves the car, operator must remove reverse handle from controller and take it with him.

The case arose out of the complaint in which the city of Buffalo alleged that one-man operation "increases the number of accidents to other vehicles and to pedestrians and decreases the headway of service." An investigation made by the street railway experts of the commission covered a period of several months and included riding and testing both one-man and two-man cars, investigation of all accidents

which have occurred on one-man cars for the first eleven months of 1924, interviews with witnesses of all fatal accidents, examination into the methods of employment, instruction and discipline of operators and inspection and tests of the safety equipment, which is installed at the time that the cars are converted from two-man operation.

In addition the commission held public hearings at Buffalo on Dec. 29 and 30. At these hearings the city was represented by its law department and the company by its attorneys, and numerous witnesses were produced and testimony taken relating to the operation of one-man cars, including type and safety equipment of cars, operation, service, headway, rules and accidents. Executives of street surface railway systems, operating one-man cars in New York, Philadelphia, Boston, Albany, Schenectady and other cities, also testified as to the results of such operation on service and accidents.

The cars used in one-man operation in Buffalo are two-man "near-side" cars converted and completely overhauled from the track to the trolley wire. In addition to the circuit breaker on the platform, a line breaker has been installed under the car in compliance with the commission's recommendation. The air braking system is reconstructed and additional pilot, triple, emergency and operators' valves are installed.

The commission says that an added responsibility is placed upon a conductor or motorman who operates a one-man car. Two positions are consolidated into one, and this of necessity requires a better type of employee. To obtain this, supplementary physical and mental examinations are required, special tests are made and individual instruction of one-man operation forms a greater part of the student operator's course of instruction. There is an increase in wage of 5 cents an hour over the prevailing rate of wages paid conductors and motormen of two-man cars. In its comment on the case the commission reviewed the method of examination and selection of operators of one-man cars.

The commission comments on the company's rule which reads:

No act must be permitted to divert attention from the proper performance of duty while the car is in motion, i.e., unnecessary conversation, reading, lounging, looking backward, adjusting equipment, turning signs, stoking stove, attracting the attention of passersby, or any condition of mind or inattention to duty which may lead to an accident.

It says testimony taken tended to show that some operators collected fares and gave and received transfers while the car was in motion. The commission says that this practice should be strictly prohibited. In its opinion the judgment and discretion allowed individual operators by the rule above quoted can be more specifically limited by enforcing the two rules which were previously quoted.

Municipal Men After Increase

The Municipal Railway at San Francisco, Cal., faces a new-year crisis in demands of the platform men for increased pay. The new wage scale submitted would increase the present rate from 67½ cents an hour to 80 cents for a 48-hour week, on a basis of 44 hours' actual work.

William H. Nancy, director of the San Francisco Bureau of Governmental Research, says the new wages, if granted, would give the municipal carmen more than the Market Street Railway men, who get 42 cents an hour at the start and 52 cents after three years of service with a 12½-hour maximum range of working hours.

Mr. Nancy declares he can foresee a possible wiping out of the Municipal Railway depreciation fund, with a financial crisis resulting if the city government meets the demands of the men.

There is much talk of a raise in fares from 5 to 6 cents. Adolph Uhl, manager of the recently organized City Efficiency League, is one of the chief proponents of the fare increase. He contends that if the proposed wage increase is granted the platform men the higher fare will be absolutely necessary. He gives figures showing that the road's yearly profits have been gradually declining from \$88,965 in 1919 to \$8,000 in 1924, owing to increased costs of material and labor.

Mr. Uhl claims that even if the supervisors deny the wage increase the Municipal Railway will still fall behind \$150,000 in the coming fiscal year, due to increased costs and a recent adjustment made in the pay of the city carmen by charter amendment. He figures that this has added \$200,000 to the road's annual expenses.

Another Suit Contests Dallas Fare

A hearing on the petition for a temporary injunction to restrain the Dallas Railway, Dallas, Tex., from charging a 6-cent fare will be held on Jan. 26 before the Sixty-eighth District Court. F. J. Geller, the plaintiff, asks that the officers of the railway be cited to state reasons why the 6-cent fare should be charged. He seeks a reinstatement of the 5-cent rate. He also asks that the property be placed in the hands of a receiver, be disposed of and that creditors be paid with the proceeds of the sale.

The agreement under which the present 6-cent fare is being charged by the Dallas Railway was to expire on Jan. 11, to which date it was extended from Dec. 27 to give John W. Everman, supervisor of public utilities, time to complete his plan No. 3. The plan specifies the extensions and new construction the city will demand shall be carried out by the railway company in return for a continuation of the higher fare.

The company up to a very late hour had not applied for the extension claiming that it would be difficult to borrow the money to make any extensions because of the suit pending before the Supreme Court contesting the right of the city to authorize a 6-cent fare

in the face of the franchise voted by the people specifying a 5-cent rate. Both the suit in the federal court and the one in the District Court were filed by W. S. Bramlette, attorney for Mr. Geller.

Additional Railway Lines Suggested for Detroit

Prospects for additional railway lines for the city of Detroit, Mich., have been increased by the agreement reached with Robert Oakman for the completion of construction of the Oakman line, and by the furnishing of estimates asked by Henry Ford on the cost of the Warren Avenue link, which it is expected Ford will finance.

The Oakman line will run from Grand River Avenue to Michigan Avenue, the only physical connection with the D. S. R. system being at Grand River Avenue. At this point it will connect with the Northwestern Belt, which was also built by Mr. Oakman and has been taken over by the D. S. R. It terminates at the Ford plant in Highland Park.

Many of the Ford employees transferred from the Highland Park plant to the River Rouge plant have homes in Highland Park and the North Woodward district. This has led the Ford organization to seek a direct route between the two plants. When estimates were requested by Mr. Ford of the cost of the lines to the Rouge, figures were also included by the D. S. R. to cover the cost of work on the present single-track Oakman line to prepare for car operation.

The Oakman line will be completed and rented to the D. S. R. with an option to purchase. This line will be completed by Mr. Oakman. It is also expected that Ford will carry out his offer to finance and build a double-track line on West Warren Avenue from the present city limits to the Oakman line. This will connect the D. S. R. lines with the Oakman line at Warren Avenue, but the building of lines on Schaefer Road and Wyoming Avenue, for which Ford made inquiry for estimates, will probably be held in abeyance. The Oakman line is considered the first step in the program of railway construction for that vicinity.

The total cost of the proposed lines in which Mr. Ford expressed interest, exclusive of the Oakman line and certain track on Michigan Avenue that would link the Oakman line with the others, is estimated at \$1,284,435. A statement of the cost was asked by Mr. Ford with a view to his financing the lines and then renting them to the city.

Certain lines in which Mr. Ford is interested would probably make it unnecessary to complete the Oakman line. It is understood that the lines to be built by Ford will be taken over by the city at cost less depreciation. The great expansion of the Ford industries in River Rouge has made it necessary to provide additional transportation facilities in that district just as soon as possible. Lack of funds on the part of the Department of Street Railways has made it impossible for the city to carry out the work at once without assistance.

Seven Cents in Binghamton

As soon after Jan. 15 as the Public Service Commission will give its approval and continuing one year thereafter the Binghamton Railway, Binghamton, N. Y., will charge a maximum fare of 7 cents within the city limits for each passenger. This is an increase of 1 cent over the present rates. This advance in rates is the result of an 8 to 3 vote of the Common Council following the submission of a report by a special committee. The company operated 50 miles of city and suburban railway.

The committee said that the company promised its employees an increase in wages of 2 cents an hour provided the higher fare was allowed. The report stated that the estimated expenses of the railway exclusive of pavement expenses of the year 1925 was \$944,800; that the estimated daily income of the railway based on a 7-cent fare was \$2,625, and the estimated daily expense of the company exclusive of paving costs was \$2,588. These figures make no allowance for depreciation of any railway property.

The company paid \$60,000 in taxes last year, of which \$2,817 was paid upon property which does not produce any income.

At the time of the receiver's discharge, he had on hand approximately \$90,000. This sum was accumulated in the last two and one-half years of the receivership. During this period nothing was paid to the receiver as salary or otherwise, and no allowance was made for attorney's fees.

Upon the discharge of the receiver on Feb. 23, 1924, this sum was turned over to the railway company and the company borrowed \$75,000 more, making the total \$165,000, but out of this amount the company was obliged, under the order of the United States Court, to pay \$98,387 immediately for receiver's fees and allowances to various attorneys. This left a balance of \$66,613, most of which was used to pay old creditors' claims, negligence claims and interest obligations maturing on May 1, 1924.

Members of New York Legislative Committees Named

In the New York Senate the Republican leaders have reduced the size of the public service committee this year from 14 to 12 members. This is the committee to which is referred measures relating to regulation and control of public utilities as well as amendments to the public service commission law. The make-up of this important committee, so far as the Senate is concerned, is practically all new. None of the Republican members of last year were named, and of the Republican appointments Senator Whitley of Rochester saw service on this committee 4 years ago. Warren T. Thayer of Chateaugay, a manufacturer, has been named chairman.

The Assembly public service committee retains its same chairman, Yale of Putnam, and its five ranking members as of last year. The chairman is a veteran legislator with fifteen years' experience in the Assembly.

Cincinnati Traction Has No Responsibility in Franchise Issues

Neither the Cincinnati Street Railway nor the Cincinnati Traction Company is an applicant for a new franchise and the Cincinnati Street Railway alone assumes the responsibility of considering any question that may arise in connection with a new grant. These facts were emphasized on Jan. 8 at a meeting of the street railway committee of City Council of Cincinnati, Ohio. The committee had under consideration the tentative grant repudiated by the Mayor and his advisers last December. The reference to the Cincinnati Traction Company was contained in a letter received from W. Kesley Schoepf, president.

President Schoepf said that the Cincinnati Traction Company and the Ohio Traction Company now had an understanding with the Cincinnati Street Railway whereby the responsibility of considering any question that might arise in connection with the new franchise was assumed by the Cincinnati Street Railway in view of the fact that it alone would be the grantee in any ordinance passed by the City Council. For this reason he said it was unnecessary for any representative of his company to attend the meeting of the committee and that in not attending no discourtesy was intended. He said that his company when requested would furnish to the Cincinnati Street Railway any information it had respecting the operation of the street railway system. The meeting was the first to be held by the committee since the introduction of the proposed grant of a new franchise by Councilman William Hess, after Mayor George P. Carrel failed to comply with the Council's resolution to submit a report on the negotiations that have been pending virtually three years.

Councilman Frank Duttenhofer, chairman of the committee, in opening the session, stated that it was to be deeply regretted that the negotiations of the committee appointed by the Council a year ago were rendered nugatory at the eleventh hour, but that the regular committee of the City Council would attempt to continue the negotiations in the hope of evolving a franchise that would prove acceptable to the company and be approved by a majority of citizens.

The meeting was attended by city officials and representatives of the Mayor's private advisers, together with delegates from civic and improvement associations. W. C. Culkins, executive vice-president of the Chamber of Commerce, informed the committee that the special traction committee of the organization would make recommendations in relation to the franchise as soon as the investigation and report of Dr. Milo R. Maltbie, traction expert, had been completed.

Samuel Assur, attorney for the Cincinnati Street Railway, made a verbal statement on behalf of his client at the session. He stated that under the new ordinance the operating company would have to create a fare control fund of \$400,000 immediately and that \$200,000 of that would have to be exhausted in addition to approximately

\$237,000, representing one-sixth of the allowed return of capital, before the fare could be increased.

Taxi Operator Offers to Run Municipal Railway in Lincoln

Thomas H. Madigan, veteran taxicab proprietor of Lincoln, Ill., has surprised the City Council by offering to operate the local municipal railway as a private venture. He tendered the Council an annual rental of \$300 for a period of 3 to 5 years. Originally, the railway was profitable and was operated for many years by a stock company. Ten years ago, the company failed and the City Council, rather than abandon the line, took over operation. By strict economy, it was possible to operate without a loss, but during the past year, the expenses have exceeded the receipts. In consequence the Council began considering the question of substituting buses for the railway. The Aldermen now feel that if Mr. Madigan is convinced he can operate the line at a profit and pay \$300 rental, the city should be able to do so. Before accepting the new offer, the Council will investigate other phases of the situation.

More Bus Lines Planned at Detroit

Traffic studies are being made by the Department of Street Railways at Detroit, Mich., in various districts with a view to adding still more bus lines. Single-deck buses will be used largely, as the commission has given up for the present the idea of purchasing double-deck buses. A deadlock between the Council and the Street Railway Commission still exists relative to the purchase of the 50 buses, bids for which were asked and were first opened last fall. As noted in the *ELECTRIC RAILWAY JOURNAL* for Jan. 10 the Mack Avenue bus line was started by the Detroit Department of Street Railways on New Year's Day and two other new lines have been announced. Service was started on Plymouth Road on Jan. 1.

Columbus Property Questions Jurisdiction on Buses

The Columbus Railway, Power & Light Company has protested against the granting of a certificate to the Columbus Motor Bus Company, organized several months ago to operate buses from the center of the city to Bexley, a suburb. Counsel for the railway contends that the commission has no authority to regulate buses in home rule cities. This question now is pending before the Supreme Court of Ohio in cases from Youngstown and Cleveland.

The protest also declares that the Rail-light Company serves this territory adequately and is "amply able financially and by reason of proper equipment to give any additional electric railway service needed." If the bus company's application for a certificate is granted, the petition alleges, operating revenues of the Rail-Light Company will be impaired with irreparable injury to the public.

Commission's Findings on Oakland Accident Questioned

Officials of the Key System Transit Company, Oakland, and the California Railroad Commission are not in agreement over a report made by the board into the fatal wreck on the Key fill in Oakland the morning of Dec. 4. The report was based on investigations made by W. J. Handford, service superintendent. In it, the companies operating trains on the fill are ordered to reduce their speed from a maximum of 35 m.p.h. to 15 m.p.h., when the block signal system indicates caution and to keep inspectors on trains to see that these orders are obeyed.

The Handford report, based on evidence at several hearings, declared that the accident was due:

1. To failure of the motorman of the San Francisco-Sacramento train to comply with the special rule in the time-table of the Key System Transit Company, which requires that on passing an automatic block signal in "caution" position, the speed of the train shall be reduced so that a stop may be made prior to passing the next signal, should the same be in "stop" position.
2. To improper placing of signals in automatic block signal territory, under conditions where high-speed trains have been injected into operation under control of signals designed for a maximum speed of 35 m.p.h., resulting in inadequate distance being available in which the effect of the automatic emergency application of brakes can function, should a signal in "stop" position be passed by a motorman.
3. To lack of proper and definite supervision of trains running on joint tracks under contract.

Acting on this report, the board ordered the Key System Transit Company immediately to:

1. Reduce the speed of all trains operating within automatic block signal limits.
 2. Issue a special time-table rule requiring all motormen to reduce speed at a block signal indicating "caution" to a maximum of 15 m.p.h., and to proceed thereafter with train under such control that a stop may be made before passing the next signal.
 3. Make frequent checks as to compliance by all motormen of speed requirements.
- Operate the block signal system between the outskirts of Oakland and the Key pier on the basis of two stop signals, one "caution" and two "clear" signals to be in the rear of a train, the second "clear" signal behind a signal indicating "caution."

When these orders were received, C. O. G. Miller, president of the Key System Transit Company, issued the following statement:

We deny that the Key System Transit Company was responsible for the accident on Dec. 4.

We deny that there was any lack of proper and definite supervision of trains and general laxity as to the important of train rules, operating regulations and special instructions relating thereto.

The Railroad Commission reached its decision without a hearing. Had the commission held such a hearing, as is customary in matters of this kind, and permitted the introduction of testimony, we believe it would not have made the report and order it did.

Mr. Miller further stated that at the present time an independent survey of the block signal system is being made by the company and if, as a result of this survey, changes are found to be necessary they will be made regardless of the commission's order.

Clyde L. Seavey, president of the commission, said in reply:

The order issued by the commission is specific and needs no further explanation. Mr. Miller could not have read the full decision. If he had he would not have made the statement he did. No further orders will be issued by this board unless the Key System Transit Company unduly delays execution of the original directions.

Michigan Motor Freight Operator Not a Public Carrier

The difference between a public and a private carrier is clearly set forth in a decision of the United States Supreme Court rendered Jan. 12, 1925, in the case of the Michigan Public Utilities Commission, et al., appellants, vs. Coral W. Duke, doing business as the Duke Cartage Company. The Michigan law provides that no person shall engage or continue in the business of transporting persons or property by motor vehicle for hire upon the public highways of the state over fixed routes or between fixed termini, unless he shall have obtained from the Michigan Public Utilities Commission a permit to do so. This permit is issued only when the public convenience and necessity require it and may be withheld when it appears that the applicant is not able to furnish adequate, safe or convenient service to the public. It also puts all such operators in the class of common carriers, requires them to carry insurance for the protection of the property required by them, etc., and imposes a fee for the privilege of engaging in the business.

The Duke Cartage Company claimed it was not a public carrier, because its entire business consisted of hauling automobile bodies made at the plants of three manufacturers in Detroit to an automobile manufacturer at Toledo and that the company did not hold itself out as a carrier for the public. The court sustained this position. The court also said that a state may rightly prescribe uniform regulations necessary for public safety and order in respect to the operation upon its highways of all motor vehicles—those moving in interstate commerce as well as others and that a reasonable, graduated license fee may be imposed, but the state has no power to impose on interstate commerce conditions and regulations which are unnecessary and unreasonable. This would be done, it said, if it required this private carrier to become a common carrier, with its onerous duties and strict liability. The police power of the state does not extend so far.

Wisconsin Road Reduces Fares

Cash and ticket fares charged by the Wisconsin Traction, Light, Heat & Power Company on its interurban lines connecting Neenah, Menasha and Appleton and between Kaukauna and Appleton were reduced on Jan. 5.

The cash fare between these points has been changed from 20 to 15 cents, with no transfer privilege, however, to city cars. Very substantial reductions have been made in the cost of tickets and weekly passes. The 25-ticket rate of \$4 has been discontinued and in its place a new book of 10 tickets for \$1.35 will be issued. This is a saving of 2 cents per ticket. Passengers who use this ticket are permitted to transfer to and from city cars. Weekly passes are sold for \$1.50 instead of \$1.75. The former rate of 12 tickets for \$1 for use in any 15-cent fare zone has been changed to 10 tickets for 75 cents, with transfer privileges to city cars.

These reductions in fares have been

made possible through the increased use of the company's interurban service by the public and numerous economies in operation.



News Notes

Franchise for Interurban Operation Rejected.—The City Council of Niagara Falls, N. Y., has rejected the application of the International Bus Corporation, a subsidiary of the International Railway, Buffalo, for a franchise to operate Buffalo-Niagara Falls de luxe interurban buses over the streets of Niagara Falls. The company asked the right to operate over Buffalo Avenue, Erie Avenue, Falls Street and Riverway to the International traction terminal at Prospect Park. The City Council said there was no necessity for a Buffalo-Niagara Falls bus route.

Collectors Employed—Fares Reduced.—To relieve rush-hour conditions in the loading of passengers on its one-man cars the Public Service Railway, Newark, N. J., announced recently that it would place collectors on cars at traffic centers to receive fares. The company also announced a reduction from 8 cents to 5 cents in the fare on the last zone of the Bloomfield line and readjustment of its Kinney and Springfield lines in this city to absorb the line which now serves the Ironbound section. The rate change went into effect on Jan. 15.

Bus Operation Restrained.—Injunctions against seven bus operators operating lines connecting Providence and Attleboro, Crompton and Phenix and Woonsocket and Blackstone, Mass., have been granted in the Superior Court at Providence, R. I., by Judge Chester W. Barrows on petitions presented by the United Electric Railways and the New Haven road. The injunctions restraining the lines are temporary.

Cars Stop While Sun Hides.—Lucius S. Storrs, president of the Connecticut Company, has announced that operations on all the company's lines will cease during the total eclipse of the sun on Jan. 24. The order has been given to comply with the request of Prof. E. W. Brown of the Yale Astronomic Observatory, New Haven, Conn.

Seeks Public Help.—The United Railways & Electric Company, Baltimore, has called upon the public for suggestions in handling traffic during bad snowstorms. The company had printed a large number of folders containing an editorial from the *Public Ledger*, Philadelphia, which was headed "What Would You Do?" The public was asked to make suggestions to the company's service department. The same editorial also was reprinted in the newspapers in the form of an advertisement.

Denies City Officials Are to Blame.—The Corporation Counsel recently filed an answer with Arthur F. Simonson, lawyer of Stapleton, Staten Island, denying the responsibility laid on Mayor Hylan and members of the Board of Estimate of New York City for the

death of Peter Champanis, who was hit by a trackless trolley on March 12, 1922. Mrs. Champanis brought suit for \$75,000 damages, but when the suit was called to trial before Supreme Court Justice Strong in the Richmond County Supreme Court, Assistant Corporation Counsel Draper moved to dismiss action on the ground that the city was not liable, as the trackless trolley cars were being operated without a franchise. Later the complaint was amended making Mayor Hylan and the individual members of the Board of Estimate defendants. The recent answer denied responsibility and alleged Mr. Champanis was killed because of his own neglect.

Pending Settlement Buses Run.—Operation of buses between Alliance and Canton, Ohio, by the Stark Electric Railroad has been resumed under special permission granted recently by the Common Pleas judge. The buses will continue to travel pending a hearing on an injunction request. In a temporary injunction issued the company was restrained from operating buses in Alliance, Canton, or the highways between the two cities. At present the Stark Electric Railroad buses have been leased to Samuel Derenberger, Canton, who has a bus schedule filed with the state officials.

Railway Gets Bus Permit.—The Public Utilities Commission of the District of Columbia recently denied the application of the Bradbury Heights Motor Bus Line to operate a bus line between Hillcrest, Good Hope and the city, but authorized the Capital Traction Company to operate buses from the terminal of the railway line at 17th Street and Pennsylvania Avenue to and into the sub-divisions of Hillcrest and Good Hope. The rate of fare as stipulated in the order, which became effective Dec. 23, 1924, is the same as charged on the electric railway lines.

Suggestions Include Temporary Relief.—Several propositions have been offered in a report of the joint special commission on the subject of the widening of the Boston Elevated Railway structure at Cambridge Street, Boston, Mass. The report has been filed in the Massachusetts Legislature by the Department of Public Utilities, which with the Transit Commission made up the special board. A few suggestions included temporary relief. The commission recommends that nothing be done until the various propositions for the solution of the problem have received further consideration.

Fares Advanced.—The Public Utilities Commission of the Territory of Hawaii authorized some time ago an increase in the fare on the cars of the Honolulu Rapid Transit Company. The new rates are full cash fare 7 cents, token or ticket fare four for 25 cents and children's token or ticket fare three for 10 cents. The decision stated that if the 8 per cent return on the rate base established in this opinion was not produced after the first 12 months it was believed that the full return would be reached "and perhaps slightly exceeded in subsequent years."

Wants City to Control Utilities.—Mayor Frank X. Schwab of Buffalo, N. Y., has instructed Corporation Coun-

sel Rupp to draw up a bill for presentation to the Legislature at Albany which would give to the city the control of public utilities within its boundaries, now exercised by the Public Service Commission. Problems such as Buffalo's one-man trolley car controversy, the Mayor said, would be taken care of in such a bill.

Services Rewarded.—Approximately 1,100 employees of the Wisconsin Public Service Corporation, Green Bay, Wis., who have been with the corporation a year or more recently received life insurance policies ranging from \$500 to \$1,000, according to the term of service. Those who have completed one year's service receive a policy for \$500 to be increased \$100 each year up to 6 years, when the maximum policy of \$1,000 is reached. Those now employed less than a year will receive a policy for \$500 at the completion of a year's connection. The insurance was placed with the Travelers' Insurance Company, which issued individual policies in favor of the employees.

Wants Permission for One-Man Car Operation.—One-man cars will be operated by the Illinois Central Electric Railway on the line connecting Canton, St. David, Bryant and Lewistown, Ill., and in the towns of Canton, Fairview and Farmington if the Illinois Commerce Commission approves.

Bus Petitions Denied.—The Public Utilities Commission of Connecticut recently decided against the petitions of J. F. Farr and Mascot, Inc., both of New Britain, Conn., to establish a bus line between New Britain and Hartford. The Connecticut company is prepared to supply the necessary service by operating buses between the points in question.

Seeks Higher Fare.—The Tide Water Power Company, Wilmington, N. C., has applied to the State Corporation Commission at Raleigh for Permission to increase city fares from 7 cents to 7½ cents, using tickets or tokens. The petition also asks for an 8-cent cash fare and a 10-cent local fare to Wrightsville Beach. In spite of every economy in operation, the Tide Water Power Company declares the inroads made by automobiles upon revenues necessitate a higher fare.

Tax Litigation To Be Settled.—In a hearing begun in the Superior Court at Seattle, Wash., the question will be decided whether King County is entitled to retain all the interest on the railway tax paid several months ago. The litigation, in which the Puget Sound Railway & Power Company, the city and county, were involved, lasted 5 years following the purchase of the local railway lines by the city. The county has divided the principal of the tax, amounting to \$401,018 with the state, school, city and port, but Treasurer W. W. Shields, acting on the advice of Chief Civil Deputy Prosecutor Howard A. Hanson, is retaining all of the interest accumulated during the 5 years. This amounts to more than \$250,000. George A. Meagher, assistant corporation counsel, asks that \$113,725 of the interest be turned over to the city, and Assistant Attorney-General Donald Fraser makes a similar demand for \$33,214 on behalf of the state.

Foreign News

London Underground Program Improves Service

The extensions and improvements of the underground system of London, England, are gradually coming into use, so that better service is being introduced on the lines of the Central London, Great Northern & Piccadilly, Baker Street and Waterloo and the Metropolitan District Railways. The southern section of the City & South London Railway was reopened Dec. 1, on the completion of the work of enlarging its tunnels.

Other factors in the rehabilitation program are the addition of new rolling stock, improvements in signaling and train-starting arrangements and the installation of a new 15,000-kw. turbo-generator at the Chelsea power station. Fifty new cars are soon to be delivered to the Metropolitan District Railway. Various station improvements now completed or nearing completion have already been mentioned in the *ELECTRIC RAILWAY JOURNAL*.

Practically all the underground lines are maintaining much shorter headways than heretofore and during the rush hours are operating additional trains or adding cars to the regular trains.

Transportation in Glasgow, Scotland, to Be Improved

Important developments in passenger transportation were dealt with by Glasgow Town Council recently. It was recommended that Parliamentary permission be sought for station and other improvements on the subway recently purchased, which are necessary if the subway is converted from cable to electric traction, as proposed. Another change is improvement of curves on the subway to permit higher speeds of cars. Loop lines or sidings for repair work are also contemplated.

By electric traction it is believed that the maximum speed of trains can be raised to 30 m.p.h., as compared with 12 m.p.h. with the cable system.

The development of bus services was also recommended.

British Tramway Wages Settled

The controversy between the British tramways and the Transport & General Workers Union was settled Nov. 13 by the National Joint Industrial Council unanimously adopting the report of the special tribunal. This tribunal was set up to investigate the claims of the employees in regard to classification, grouping of tramway undertakings and increase in wages.

The report recommended classification and maximum and minimum wages for each class, so adjusted that no man should receive an increase of more than 1s. 6d. a week above the present rate. Extra pay for night work was recommended and it was also proposed that new scales should be stabilized until at

least April, 1926. Besides adopting the award, the Council recommended that it be operative as from Nov. 18.

One of the employer's representatives said the settlement was one of the most satisfactory that had been reached in the history of the tramway industry and that it had been arrived at in a most amicable spirit.

New Electric Railway Planned in England.—Negotiations are taking place for the construction of the Worcester & Broom Railway, for which an act of Parliament was obtained several years ago. The new line when completed will form a direct route between Worcester and South Wales and between Blisworth and Cambridge, and beyond. It is proposed that stations be erected at Worcester, Broughton, Hackett, North Piddle, Radford, Dunnington and Broom. Some of these places are at present 6 and 7 miles from a railway station.

Pekin Sees Street Cars.—The walled city of Pekin, China, witnessed on Dec. 17 the inauguration of a system of street cars. Crowds gathered about the street for the trial run of brilliantly decorated vehicles which moved slowly through the city using overhead current. There are 30 miles of track. The plan is to run the system beyond the city walls. It is said that many thousand jinrikisha coolies are worried for fear the new transportation methods will affect their livelihood.

Glasgow Corporation Buys Paisley Tramway.—The tramway of Paisley, Scotland, a private company, was purchased some time ago by the Glasgow Corporation and is now being operated as a part of the municipal tramway system of Glasgow. Paisley is located about 6 miles from Glasgow and through cars operate between the two cities.

Paris Underground Increases Bond Issue.—The bond issue of the Nord-Sud Underground Railway, Paris, France, was increased 34,000,000 francs the last of October. In conformity with the agreement with the Paris municipality, the interest payments are to be deducted from the gross receipts and any deficit between the remainder and expenses will be reimbursed by the city of Paris. In case of the final purchase of the line by the city, the municipality will assume responsibility for payment of interest.

Bradford to Keep Weekly Pass.—The weekly pass is to be continued on the tramways in Bradford, England, but will now be non-transferable. Penny stages are also to be given a 6 months' trial. The tramways committee was in favor of abolishing the passes, but after a discussion with the Town Council the committee was overruled by three votes. It was stated that the income from passes in November was £1,526 a week, or about one-seventh of the gross income of the tramway.

Financial and Corporate

New Income Ruling

Employees of Municipally Owned Utilities Liable for Taxes as Far Back as 1918

All employees of municipally owned institutions, such as water, light and electric railways, which are defined as acting in a proprietary rather than in a governmental capacity, are subject to federal income tax on their compensation. They will have to pay taxes on their incomes as far back as 1918, and the Bureau of Internal Revenue has notified collectors of internal revenue to compel the filing of returns over those years.

The ruling, far-reaching in its application, is based on court decisions in several sections of the country, which have held, in effect, that such institutions as were named were competing with private enterprise and should occupy a similar footing with respect to certain taxation features. Officials of the bureau declined to be definite in the application of the ruling, which was made by Solicitor Nelson T. Hartson, and the problem of enforcement has been left in the hands of local internal revenue collectors.

There are a dozen or more cases, involving similar questions, pending before the bureau, and it was the opinion of officials that final adjudication of these will aid materially in constructing and applying the law.

The Solicitor's ruling made these specific statements:

In deciding whether or not any particular activity in which a state or municipality may be engaged is a governmental function, the attitude of the federal rather than the state authorities should govern.

The compensation received for services rendered in connection with a municipally owned water system is not exempt from income tax.

As a result of the ruling and the expected decision on other similar questions in like fashion, every city or state or other political subdivision operating such quasi-public institutions, it is believed, will find it necessary to go through its records and provide the collectors of their districts with full information about their employees, present and past. From these, the collectors will be able to trace down the persons who hitherto had filed no returns, believing that they were not subject to the federal income tax because they were employees of institutions supposed to be exempt by law.

Knowledge of the bureau's ruling came upon a request by Senator Shortridge of California, who sought to obtain from Commissioner Blair reasons for the assessment of taxes on employees of the municipally owned water and light system of Riverside, Cal. The commissioner's letter to Senator Shortridge caused the bureau to make public the ruling.

Senator Shortridge announced he did not consider the letter as having ended the controversy, and that he intended to press the question in the hope of pre-

venting the ruling being made final in its present form. He asserted that he was not satisfied with the authorities used by Commissioner Blair as the basis for giving the ruling retroactive effect.

The first reaction to the decision is heard from Seattle. It has been estimated there that 2,800 employees of the Seattle utilities, including employees of the Seattle municipal railway, are liable for the tax. Long before the Washington, D. C., decision, however, the matter seems to have been up for consideration in Seattle. In fact, injunction proceedings were instituted by Corporation Counsel T. J. L. Kennedy against the local collector in the federal court to prevent collection of such tax last spring, when notice was served on employees of the Seattle Municipal Railway that they must make income tax returns. The case was still pending when the ruling from headquarters

was issued. The demand was made that the railway employees pay the tax, Mr. Kennedy said, on a ruling that the municipal railway was a proprietary business.

Bondholders Take Over Danbury & Bethel Property

The Danbury & Bethel Street Railway, Danbury, Conn., has been taken over by the first mortgage bondholders, mostly of Boston, Mass. William Sperry, New Haven, Conn., is general manager of the line.

Robert A. Manwaring, general manager of the New Haven Illuminating Company; William W. Walker, Shore Line Electric Railway, New Haven, and George R. Tweedy of Danbury, appraisers on the property of the Danbury & Bethel Street Railway, have returned figures to the Superior Court showing a total valuation of \$529,981.

The receivership will be continued until such time as the court decides the priority of certain claims against the company and payment of the claims has been made in accordance with the court's findings.

New York Companies Doing Better

17,000,000 More Passengers Carried in 1923 than in 1922—Group Still Shows Deficit, but the Operating Ratio Is Down—Interesting Five-Year Comparison of Fares

OPERATING revenues of electric railways in New York State other than those in New York City for 1923 show an increase of approximately \$700,000 over those for 1922, with a decrease in operating expenses of approximately \$1,300,000. For the sixth consecutive year, this group of companies has failed to have gross income sufficient to meet fixed charges. The net loss for 1923 was smaller than in 1921 or 1922 and the operating ratio is more favorable. Analysis of the figures indicate that this better showing is the result of both increased operating revenues and decreased operating expenses and fixed charges. In its report for the year the Public Service Commission says that this may be attributed in part at least to the fact that with only one exception there were no serious interruptions of electric railway service because of strikes and the effect upon the riding public of those initiated in prior years is gradually disappearing. The number of passengers carried during the year 1923 (616,377,402) shows an increase of approximately 17,000,000 more than in 1922. There were 643,870,858 passengers carried in 1921 and 748,233,247 in 1920. These facts are all

taken from the report of the Public Service Commission filed with the Legislature on Jan. 15.

During the year the receivership on the Buffalo & Lake Erie Traction Company's property was terminated, and a new company known as the Buffalo & Erie Railway was formed to take over and operate a portion of the former property. The urban portion within the city of Erie, Pa., has been included within a separate corporation to be known as Erie Railways. Operation of the urban lines of the Wallkill Transit Company within the city of Middletown was discontinued and bus service was substituted.

The commission has been officially informed that approximately 30 per cent of the motor buses sold during the past year were purchased by electric railway corporations. Such buses have been put in service upon lines designed to render service in recently developed territory in which there is a reasonable demand for service, which is too light to support the expenditure required for electric railway construction. They have also been put in operation within older sections of cities in which there has been inadequate service, or to sup-

STATEMENT OF DIFFERENT FARES CHARGED IN NEW YORK STATE OUTSIDE OF NEW YORK CITY

Item	1920		1921		1922		1923		1924	
	Cities	Per Cent of Total	Cities	Per Cent of Total	Cities	Per Cent of Total	Cities	Per Cent of Total	Cities	Per Cent of Total
5 cents.....	19	33	16	28	15	26	13	23	13	23
6 cents.....	5	8	9	16	8	14	7	13	3	5
7 cents.....	24	43	16	28	43	77	47	84	24	43
8 cents.....	9	16	16	28	13	23	13	23	15	27
10 cents.....									1	2
Total.....	57	100	57	100	57	100	57	100	56	100

RESULTS OF OPERATIONS OF ELECTRIC RAILWAYS IN NEW YORK STATE OUTSIDE OF NEW YORK CITY

Item	1921	1922	1923
Railway operating revenues.....	\$42,824,208	\$41,858,280	\$42,530,753
Railway operating expenses.....	37,290,565	36,978,228	35,674,050
Net revenue railway operations.....	\$5,533,646	\$4,880,052	\$6,856,704
Railway tax accruals.....	2,779,829	2,872,018	2,938,251
Railway operating income.....	\$2,753,813	\$2,008,034	\$3,918,453
Net revenue, other operations.....	817,335	1,302,688	1,101,937
Non-operating income.....	1,086,074	924,942	854,571
Gross income.....	\$4,657,220	\$4,235,664	\$5,874,961
Interest charges.....	8,548,575	9,034,475	8,620,343
Other deductions from gross income.....	642,060	694,362	623,402
Net income.....	Loss \$4,533,411	Loss \$5,493,173	Loss \$3,368,784
Dividends during year.....	419,659	1,770,977	1,213,458
Passengers carried (fares and transfers).....	643,870,858	599,080,364	616,377,402
Revenue car-miles.....	91,059,219	92,481,319	92,135,786
Mileage in New York state.....	2,001	1,990	1,971
Operating ratio.....	87.08%	88.34%	83.88%

plement present lines now overloaded. Such service has been rendered in Utica, Syracuse, Rochester and Buffalo. In the cities of Cohoes and Rochester, trackless trolleys have been installed. In this connection it is pointed out that electric railways desiring to engage in the motor bus transportation business have been obliged under existing laws to organize separate corporations for that purpose. The commission favors an amendment of the law so as to permit street railways to operate auxiliary bus transportation under such safeguards and regulation as may be proper.

The mileage decrease for the year is shown as 20 miles, of which approximately 18 miles was due to the abandonment of its entire road by the Orange County Traction Company. The commission says that in cases where sections of electric railways are abandoned, motor bus service is usually provided. The total of 1971 includes some of those roads over which operation has been discontinued and it is probable that some of these will be permanently abandoned.

In a proceeding instituted before the commission, entitled "In the Matter of the Application of the Village of Mamaroneck for a Prohibition Order against the Public Service Commission and New York & Stamford Railway" and later carried to the state courts, the Court of Appeals affirmed an order of the Appellate Division, Third Department, reversing an order of the Special Term (Howard, J.) denying the petition of the village of Mamaroneck for a prohibition order to restrain the commission from approving the tariff schedule filed by the New York & Stamford Railway. The decision holds that the authority granted to the commission by chapters 134 and 335 of the laws of 1921, amending the Public Service Commission Law, to modify rates of street railway contained in franchise with municipality was taken away by the enactment of chapter 891 of the laws of 1923, and that such authority did not continue for purpose of granting application made prior to June 1, 1923, the date on which chapter 891 of the laws of 1923 became effective.

The commission has again renewed its recommendation to the Legislature for the early enactment of detailed statutory provisions setting forth the extent to which the Legislature intends that the commission shall exercise regulatory powers over the operation and maintenance of bus lines. The commis-

sion says that its jurisdiction over bus lines is apparently expressly limited to the granting of certificates of convenience for the operation of such lines or routes outside of New York City. Unless this is the legislative intent it requests a modification of this provision so far as lines operating in and out of New York City are concerned.

\$4,500,000 Financing Placed

Brooklyn City Railroad Equipment Issue and Interurban Note Issue Before the Public

Two issues of electric railway securities were offered to the public by Halsey, Stuart & Company, New York, during the week ended Jan. 17. They were \$3,750,000 of Brooklyn City Railroad equipment trust 5 per cent gold certificates, series A, and \$750,000 of Chicago, Aurora & Elgin Railroad two-year 6½ per cent secured gold notes.

The Brooklyn City Railroad issue was dated Jan. 15, 1925, and is due serially in equal amounts of \$375,000 yearly until Jan. 15, 1935. The issue was priced to the public to yield 4.50 for the Jan. 15, 1926, maturity to 5.50 per cent for the Jan. 15, 1935, maturity. The certificates are to be issued under an equipment trust agreement and lease to the Brooklyn Trust Company, as trustee, whereby title will be held by that company to equipment costing in excess of \$5,000,000, or more than 133 per cent of the principal amount of the issue.

The equipment will be operated by the railroad at a rental sufficient in amount to provide for the annual installments of maturing principal and "dividends" on the certificates. The title to all the equipment will remain

with the trustee until final payment of principal and "dividends" on the entire issue.

It is explained that the equipment covered by the certificates is of the latest standard type for operation in urban service. It will consist of 335 double-end, four-motor, front-entrance, center-exit, double-truck, steel frame cars with complete safety-type control. Cars similar to the new ones are now being operated successfully by the railway.

EXCELLENT DIVIDEND RECORD

The bankers explain that the company has an uninterrupted dividend record since 1855 except for the period from October, 1919, to September, 1922. Cash dividends aggregating 10 per cent were paid during the fiscal year ended June 30, 1924, on \$12,000,000 of capital stock then outstanding. The capital stock was increased to \$16,000,000 by a stock dividend of 33½ per cent paid Sept. 30, 1924, which substantially offset the absence of dividends from 1919 to 1922. A quarterly dividend of 2 per cent and an extra dividend of one-half of 1 per cent was paid Dec. 1, 1924, upon the increased capital stock.

The Chicago, Aurora & Elgin Railroad issue is dated Dec. 1, 1924. The offering price was par to yield 6½ per cent. The notes are to be secured by pledge with the trustee of \$1,000,000 principal amount of the company's refunding and improvement mortgage 6 per cent gold bonds, series C, due Dec. 1, 1934. Application to create both the issues of bonds and notes has been made to the Illinois Commerce Commission. The proceeds from the sale of the notes will be used to fund current loans and for additions and betterments. Thomas Conway, Jr., president of the railway, explains that for the twelve months period ended Oct. 31, 1924, gross earnings were \$2,358,726. Net earnings during the same period before depreciation were \$503,327 as compared with annual interest of \$232,000 on the company's funded debt to be outstanding upon completion of the present financing.

Traffic Declines Again on Detroit Municipal Railway

The city of Detroit, Department of Street Railways, has given out operating statistics for the months of November and October, 1924, compared with similar months of 1923. The accompanying table shows the traffic and income figures.

CITY OF DETROIT, DEPARTMENT OF STREET RAILWAYS				
	November, 1924	November, 1923	October, 1924	October, 1923
Total revenue from transportation.....	\$1,597,608	\$1,799,220	\$1,680,926	\$1,867,943
Total operating revenue.....	1,649,701	1,886,857	1,730,559	1,966,187
Total operating expenses.....	1,167,655	1,401,541	1,235,365	1,449,921
Net revenue from railway operations.....	\$482,046	\$485,316	\$495,194	\$516,266
Taxes and rent deductions.....	59,845	59,379	59,798	59,379
Net operating income.....	\$422,201	\$425,937	\$435,396	\$456,888
Total non-operating income.....	14,763	1,006	10,966	43,143
Gross income.....	\$436,964	\$426,943	\$446,362	\$500,030
Total deductions from gross income.....	402,719	366,364	415,349	378,045
Net income.....	\$34,245	\$60,579	\$31,014	\$121,986
Total car-miles operated.....	3,765,393	4,077,195	3,955,498	4,302,638
Total passengers carried.....	34,980,603	39,071,049	36,909,526	40,590,326

Reorganization Likely Soon

Receivership of New York Railways
May Be Lifted Feb. 1—Security
Holders Reconciled

Difficulties among the several protective committees involved in the reorganization of the New York Railways, operating about 70 miles of line principally in Manhattan Borough, New York City, have been composed and it is expected the plan of readjustment will be declared operative about Feb. 1. The reorganization will be placed in effect substantially as drawn, only minor changes in regard to the method of the participation of security holders in the subsidiary lines having been made.

The proposed plan of reorganization calls for the acquisition by the new company, through foreclosures and creditors' sales, of all assets of New York Railways now in the hands of the receiver except such property now owned which is not used in the operation of the railway system. No assessments of any description are to be levied against any security, and new money required for purposes of the reorganization and for capital requirements is to be provided out of the proceeds received from the sale of non-operating assets.

The drastic reductions in capitalization and annual fixed charges by which it is proposed to establish the new company along sound financial lines follow:

FINANCIAL SET-UP OF SUCCESSOR TO NEW YORK RAILWAYS

Existing company:	Principal	Fixed Charges
Bonds—fixed charges.....	\$39,425,198	\$1,751,093
Stocks—dividend rentals...	3,836,700	346,966
Total fixed charges securities.....	\$43,261,898	\$2,098,059
N. Y. Rys. adj. inc. bonds..	30,609,487	1,530,474
N. Y. Rys. stock.....	17,497,060	.....
Total.....	\$91,366,445	\$3,628,533
New company:		
Total fixed charge bonds...	\$19,353,060	\$967,500
New income bonds.....	19,435,472	1,166,128
Preferred stock—184,830 shares.....	No par	.....
Common stock—90,200 shares.....	No par	.....
	\$38,788,472	\$2,133,628

The *Wall Street Journal* says that operating results for the five months ended Nov. 30, 1924, after giving effect to the changes in maintenance allowances contemplated in the reorganized company, show good earning prospects. Substantial reductions were made in operating costs, particularly in the operation of power plant, and large additions made to gross income as a result of a cut in maintenance from 38 per cent of total transportation revenues to 25 per cent. The latter rate was adopted in accordance with the suggestions of expert engineers, and brought maintenance charges in conformity with maintenance charges effective on other electric railway systems.

Comparative operating statistics for five months ended Nov. 30, 1924, and 1923 are given in the accompanying table.

Gross income of \$750,997 for the five months represents an approximate an-

COMPARATIVE STATEMENT OF NEW YORK RAILWAYS FOR FIVE MONTHS

	1924	1923
Gross revenue.....	\$3,543,581	\$3,856,388
Operating expenses:		
Maintenance of way and structures.....	482,859	778,271
Maintenance of equipment...	349,656	558,469
Operation of power plant.....	242,608	423,551
Operation of cars.....	1,092,901	1,138,165
Injuries to persons and prop- erty.....	266,405	281,419
General and miscellaneous ex- penses.....	165,255	201,117
Total operating expenses...	\$2,599,684	\$3,380,994
Taxes.....	298,429	349,431
Total operating expenses and taxes.....	\$2,898,113	\$3,730,425
Income from railway operation	645,468	125,963
Non-operating income.....	105,529	116,001
Gross income (available for interest).....	\$750,997	\$241,964

nual rate of \$1,800,000. In the opinion of competent engineers testifying before the Transit Commission this amount can be increased by approximately \$1,200,000 through various changes in operating methods and capital investments approximating \$3,800,000. Whether or not earnings in accordance with these estimates are possible of immediate realization is uncertain; substantial increases appear entirely possible with able management of the reorganized properties, and ample funds for working capital are provided in the plan. It has been estimated that earnings in the first year of operation under the plan will cover all fixed charges, including interest on \$19,435,472 of 6 per cent income bonds.

Bus Lines in Pennsylvania Taken Over by Electric Railway

Buses operated by the West Chester Transportation Company between Wilmington, Del., and West Chester, Pottstown and West Chester and West Chester, Norristown and Valley Forge and other points in Chester and Montgomery Counties in Pennsylvania have come under the control of the Peoples Transportation Corporation, a subsidiary of the West Chester Street Railway.

Through the acquisition of the holdings of the West Chester Transportation Company the new owners have obtained an additional fleet of 14 modern motor coaches, together with a large terminal building in West Chester. The structure is one of the largest there and is well adapted to the requirements of the bus transportation business, having been laid out to suit the purpose by the former owners.

The motor coach routes which were operated by the West Chester Transportation Company will be consolidated with the unified electric railway and motor coach system of the West Chester Street Railway Company and the Peoples Transportation Corporation.

Comprehensive plans for the betterment of the service and a rearrangement of schedules to afford more convenient and efficient service are being worked out and will be put into effect in the near future.

The story of the co-ordination of the bus and the railway in southeastern Pennsylvania by these companies was reviewed at length in the *ELECTRIC RAILWAY JOURNAL* for Nov. 22, page 881.

Sixteen-Mile Georgia Interurban Suspends

Service on the Atlanta Northern Railway, or Marietta interurban line, the stock of which is owned by the Georgia Railway & Electric Company, was discontinued on Jan. 14 because of losses resulting from unfair bus competition. The road has about 16 miles of track. The discontinuance of service was not precipitate. It followed an announcement made as far back as Nov. 21, 1924, in a letter to city authorities of Marietta, Smyrna and Atlanta and to county commissioners of both Fulton and Cobb Counties, that the road could no longer continue unless the bus as a competitor was eliminated. This announcement was repeated twice in statements before the City Council of Marietta, not as a threat but simply as a declaration of the inevitable fact that the inroads into the line's revenues soon would make a discontinuance of service necessary.

In the year 1923 the Atlanta Northern Railway failed to earn bare operating expenses, taxes, renewals and interest on debt by the sum of \$19,500. Since the operation of buses began the railway receipts have decreased \$202 a day, or at the rate of \$73,730 a year, making the aggregate loss in operations at the rate of \$93,200 a year. This means that it is costing \$93,200 a year more to run the road than it is taking in. The attitude of the company is that the line cannot possibly resume operations until it is in a position to earn its way.

With the opening of the new concrete road from Marietta to Atlanta, a line of buses began operating between Marietta and Atlanta, running along the highway, over the streets of Marietta, Smyrna and Atlanta, crossing the bridge over the Chattahoochee River immediately paralleling the line of the Atlanta Northern Railway. These buses could only operate by the consent of the governmental authorities of Marietta, Smyrna and Atlanta, the County of Cobb and the County of Fulton. Any one of them could forbid the operation of buses over the particular section of road or streets under its several jurisdictions.

The railway respectfully suggested that in the public interest this ought to be done. It said that "to permit these buses to operate on a roadway provided for them at public expense, a large portion of which this company has itself paid for, over a bridge which this company built, taking away the revenue essential for the support of the railway service, is manifestly unfair to the Atlanta Northern Railway, and in the end would, as we pointed out to county and city officials in a letter on Nov. 21, 1924, mean the discontinuance of its operations." The railway further said:

The buses operating without charge on the recently paved public highway built at public expense, free of cost to the bus operator, and running over pavements and bridges for which this company paid, free of any charge to the bus owner, resulted in grossly unfair competition with the interurban line. The bus charges only the full cash fare, depriving the interurban line of its profitable customers, leaving the interurban only the low-priced commuters. The company called attention to the fact that this would unquestionably increase the loss of the interurban line to such an extent that it could not continue to operate.

Personal Items

W. E. Thompson Vice-President

Third Avenue Railway Official Made an Executive, but Retains Transportation Post

W. E. Thompson, for 6 years superintendent of transportation of the Third Avenue Railway, New York, has been elected vice-president of that organization. Mr. Thompson will continue in charge of transportation, following the line of activity in which he has specialized throughout his railroad career of more than 20 years.

Mr. Thompson has made a special effort toward the development of sound industrial relations in the transportation department and in fostering better public relations through immediate and tactful response to all complaints and suggestions. He was a leading factor in presenting to the people of the Bronx and to the city at large the advantages of the Third Avenue Railway's plan involving co-ordination of trolley and bus service with transfer privileges between the two, in connection with the proposed granting of bus franchises by the city of New York.

He is interested in every movement for the betterment of his own organization and the industry at large. He was most active and successful in the development of the new Metropolitan Section of the American Electric Railway Association and at the organization meeting of that section on Sept. 24, 1924, he was elected its first president.

Mr. Thompson was born in 1876 in Mecklenburg County, Virginia. After attending the local schools, at the age of 18 he entered industrial life in a tobacco manufacturing business in his native county. Before many years he entered the street railway business, starting at the bottom with the old Virginia Passenger & Power Company, Richmond, now the Virginia Railway & Power Company. After service on the cars, and as starter and inspector, he became division superintendent under S. W. Huff, now president of the Third Avenue Railway, who was then general manager of the Richmond company.

In 1908 Mr. Thompson was called to Brooklyn as chief inspector and assistant superintendent of transportation of the Coney Island & Brooklyn Railroad, again under Mr. Huff, who had left Richmond to become president of the Brooklyn company. In 1911 he became superintendent of transportation, and in 1914 when the Coney Island & Brooklyn Railroad was taken over by the Brooklyn Rapid Transit Company he was made superintendent of the Brooklyn & North River Railroad, which was jointly operated by the Brooklyn Rapid Transit, New York Railways and Third Avenue Railway. Mr. Thompson remained in that position until 1919, when he became connected with the Third Avenue Railway as superintendent of transportation.

A portrait of Mr. Thompson was

published in the *ELECTRIC RAILWAY JOURNAL* for Oct. 4, 1924, at the time of his election to head the Metropolitan Section.

F. R. Coates Heads C. E. R. A.

Well-Known Toledo Official Elected President of the Central Association at Dayton Meeting

Frank R. Coates of Henry L. Doherty & Company and president of the Toledo, Ottawa Beach & Northern Railway, Toledo, Ohio, was elected president of the Central Electric Railway Association at the meeting in Dayton, Ohio, on Jan. 9. Mr. Coates was formerly president of the Toledo Traction, Light & Power Company, where



F. R. Coates

he resided, but he removed to New York about a year ago to assume general supervision over all of the utility properties of that company.

Mr. Coates' hobbies have been described as smiling, baseball and boating. His chief aim doesn't have to be described. It is making friends. As one of his immediate associates in the Doherty organization said of him, that company has in Mr. Coates a philosopher of the genuine type, whose good humor is impervious to such trifles as franchise troubles, street car strikes and delays in the receipt of equipment.

For a long time it was thought that Mr. Coates had no invulnerable spot, but that spot is said to have been discovered several years ago during the ninth inning of a game between his "Rail-Light," composed of men from the Toledo company, and a Cincinnati team being played to decide the national amateur championship. Just when two were on, two out and the score tied, someone sent a hurry telephone call from New York to Toledo for Mr. Coates and it was relayed to the ball park. After a while Mr. Coates' philosophic soul calmed down and he answered the phone.

Mr. Coates was born in Philadelphia on June 20, 1869. He was graduated

from Lehigh University in 1890, and took a post-graduate course the following year. Mr. Coates found some time aside from his scholastic pursuits to interest himself in Lehigh athletics and captained the track team for two years, starred on the football eleven and class lacrosse team and managed the nine. To anticipate inquiries it had best be stated that Mr. Coates' activities with the track team consisted in holding the mile walk record. He began work as a rodman with the Baltimore & Ohio Railroad at Pittsburgh. By 1892 he had advanced through the ranks to supervisor of the Wheeling division.

In May of the next year he was made assistant roadmaster of the New York Division of the New York, New Haven & Hartford Railroad in charge of maintenance and new track construction, and in December, 1895, he hung his hat on the roadmaster's hook.

Still not satisfied, he jumped several more rounds, and in October, 1900, became chief engineer of the Chicago, Great Western Railroad. In May, 1904, he entered the engineering and construction business and built bridges for electric railroads and hydro-electric plants until December, 1909, the last two years devoting his time to the Stone & Webster Engineering Corporation. Then he was made vice-president of the Inter-Ocean Steel Company with headquarters at Chicago. He remained there until December, 1911, when he went to Toledo as president of the Toledo Railways & Light Company. At Toledo he had a large part in the settlement of the franchise matter. Behind that sentence, however, there is a big story, far too big to be told here.

During the Spanish War Mr. Coates joined the Fourth Connecticut regiment as regimental adjutant.

Mr. Coates is second vice-president of the American Electric Railway Association.

Roy W. Mathisson Appointed Auditor at Knoxville

Roy W. Mathisson was appointed auditor of the Knoxville Power & Light Company, Knoxville, Tenn., on Jan. 1. Mr. Mathisson went to the Knoxville property from Birmingham, Ala., where he occupied the position of chief clerk in the auditor's office of the Birmingham Electric Company. In 1915 Mr. Mathisson became general auditor of the Houston Lighting & Power Company, Houston, Tex., and remained there until 1917, when he entered the air service of the United States Army, with which he continued until January, 1919. In February, 1919, he entered the service of the Birmingham Railway, Light & Power Company, now known as the Birmingham Electric Company. He continued in that position up to the present time. Mr. Mathisson was born in New York City. He attended the public schools and high school in Birmingham. Later he took a course at the Alabama Polytechnic Institute, Auburn, Ala.

C. A. Briggs, who has held the position of secretary and auditor of the Knoxville Power & Light Company, will retain his position as secretary and in addition to his duties of that office will have other duties assigned to him.

Harold E. West, a member of the Maryland Public Service Commission, has been made chairman of that body to succeed Ezra B. Whitman, who resigned the chairmanship. Mr. Whitman continues as a member of the commission.

Edward P. Bell has been appointed acting superintendent of overhead construction of the Chicago & West Towns Railway, Oak Park, Ill. The appointment was effective Jan. 1, 1925.

R. Colwell, superintendent of the Edmonton Street Railway, Edmonton, Alberta, since 1921, has been appointed traffic manager of the Winnipeg Electric Railway. The system at Edmonton is municipally owned and operated.

Paul Romig has been named superintendent of railways by the Menominee & Marinette Light & Traction Company, Marinette, Wis.; Wilfred Bellmore has been named supervisor of traffic, Oscar Carlander has been placed in charge of equipment and carhouse and John Burns in charge of rail equipment.

C. L. Fosters is chief engineer of the Laurel Light & Railway Company, Laurel, Miss.

Obituary

James A. Brett, electrical engineer and inventor and Cincinnati district manager of the Westinghouse Electric & Manufacturing Company, died on Jan. 8 at Hamilton, Bermuda. Mr. Brett was widely known in the electrical industry. Many of the first interurban electric railways in the East were constructed under his direction. After finishing school he entered the Sprague Electric Works of Mount Vernon as an apprentice, and did much of the early development work on electric railway apparatus. For a number of years he took an active part in the railway construction work both in the East and in the Middle West. He went to Cincinnati as manager of the Cincinnati district of the Westinghouse company in 1905.

Safford S. Delano, formerly of St. Louis and for the last 25 years treasurer of the American Car & Foundry Company, died at his home in New York City Dec. 27. With the organization of the car company in 1899, Mr. Delano went to St. Louis from Detroit to become treasurer of the new organization. In 1908 his headquarters were moved to New York. He was 68 years old.

Joseph E. Dozier, formerly general manager of the Nahant & Lynn Street Railway, died on Jan. 7 at Miami, Fla. Mr. Dozier started his career with the Atlanta Telephone Company in Atlanta, Ga., the city of his birth. He later went North and accepted a position with the New England Telephone & Telegraph Company at the Milk Street Exchange, Boston, Mass. In 1895 he was appointed manager of the Quincy exchange. Very soon after this Mr. Dozier became manager of the Nahant & Lynn Street Railway, which position he filled for 14 years with great success. He next became connected with the Northway Motor Organization of Boston and Natick.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Manufacturers of Ten Countries Contribute to Java Electrification

A typical example of the increasing participation of American manufacturers of railroad equipment in foreign fields is furnished in the case of the Java State Railways, which is planning to use modern cars and trailers for suburban passenger service on a section that includes the cities of Batavia and Meester Cornelis. To this work of modernization manufacturers in ten countries are contributing. They are the United States, India, Holland, France, Belgium, Cuba, Switzerland, Canada, Germany and England.

Makers of equipment in the United States are furnishing the major part of the electrical equipment, the rubberoid for the roofs, the devices for coupling in emergency to the existing steam trains, the vestibule buffers, the pneumatic door-operating mechanisms and the car seats.

The General Electric Company is electrically equipping 10 of the cars and the Westinghouse Company five. The other 15 of the 30 cars on order are trailers. The Electric Storage Battery Company, Philadelphia, is furnishing Exide batteries, and the J. G. Brill Company, Philadelphia, the car seats. The pneumatic door-opening mechanism is manufactured by the Consolidated Car Heating Company, Albany, and

the rubberoid by the Ruberoid Company, New York.

India is furnishing the teakwood for the roofs. France is contributing the wood for the floors. The all-steel bodies are being built in Holland. The window glass, wheels and axles are from Belgium, and mahogany for interior trim from Cuba. Switzerland is supplying the wiring devices and Canada the asbestos linings. The truck springs are from Germany and the air brakes from England.

The trolley voltage is 1,500, direct current, and each motor car will carry a motor-generator set to supply 65-volt current for operating the control mechanism and air compressors, supplying the lights and charging the storage batteries. The so-called subway type of ceiling fan will be used in motor cars and trailers.

G. E. Orders Show Increase

Orders received by the General Electric Company for the three months ended Dec. 31 totaled \$80,009,978, an increase of 7 per cent over a similar quarter in 1923, according to figures made public by Owen D. Young, chairman of the board of directors.

For the year 1924 the orders received totaled \$283,107,697. This compared with \$304,199,746 for 1923, a decrease of 7 per cent.

ELECTRIC RAILWAY MATERIAL PRICES—JAN. 15, 1925

Metals—New York

Copper, electrolytic, cents per lb.	15.125
Lead, cents per lb.	10.55
Nickel, cents per lb.	31.00
Zinc, cents per lb.	8.22
Tin, Straits, cents per lb.	58.50
Aluminum, 98 to 99 per cent, cents per lb.	27.00
Babbitt metal, warehouse, cents per lb.	
Fair grade.	60.00
Commercial.	28.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads.	\$4.20
Somerset mine run, Boston.	2.125
Pittsburgh mine run, Pittsburgh.	1.875
Franklin, Ill., screenings, Chicago.	1.95
Central, Ill., screenings, Chicago.	1.95
Kansas screenings, Kansas City.	2.50

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton.	\$43.00
Standard open hearth rails, gross ton.	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	3.05
Tie plates (flat type), cents per lb.	2.425
Angle bars cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.025
Steel bars, cents per lb.	2.10
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	\$1.60

Hardware—Pittsburgh

Wire nails, base per keg.	2.85
Sheet iron (28 gage), cents per lb.	3.60
Sheet iron, galvanized (28 gage), cents per lb.	4.75
Galvanized barbed wire, cents per lb.	3.55
Galvanized wire, ordinary, cents per lb.	2.60

Waste—New York

Waste, wool, cents per lb.	16
Waste, cotton (100 lb. bale), cents per lb.	
White.	13-19
Colored.	10-15

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	\$1.18
White lead (100 lb. keg), cents per lb.	0.167
Turpentine (bbl. lots), per gal.	0.92
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4-6

* Prices f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	17.25
Rubber-covered wire, No. 14, per 1,000 ft.	\$7.25
Weatherproof wire base, cents per lb.	20.00

Paving Materials

Paving stone, granite, 4x8x4, f.o.b. Chicago, dressed, per sq. yd.	
Common, per sq. yd.	
Wood block paving 3 1/2 x 16 lb. treatment, N. Y., per sq. yd.	\$2.67
Paving brick 3 1/2 x 8 1/2 x 4, N. Y., per 1,000 in earload lots.	51.00
Paving brick 3 1/2 x 8 1/2 x 3 N. Y., per 1000 in earload lots.	45.00
Crushed stone, 1-in., earload lots, N. Y., per cu. yd.	1.85
Cement, Chicago consumers' net prices, without bags.	2.10
Gravel, 1-in., cu. yd., f.o.b. N. Y.	2.25
Sand, cu. yd., N. Y.	1.25

Old Metals—New York and Chicago

Heavy copper, cents per lb.	12.25
Light copper, cents per lb.	10.50
Heavy brass, cents per lb.	8.00
Zinc, old scrap, cents per lb.	4.50
Lead, cents per lb. (heavy)	8.75
Steel car axles, Chicago, net ton.	\$22.75
Cast iron car wheels, Chicago, gross ton.	22.75
Rails (short), Chicago, gross ton.	22.75
Rails, (relaying), Chicago, gross ton.	26.50
Machine turnings, Chicago, gross ton.	14.25

Rolling Stock

Brooklyn City Railroad, Brooklyn, N. Y., has placed an order for 335 cars. In the design these cars are similar in nearly all respects to the 200 cars ordered more than a year ago except in seating arrangement. With the idea of getting passengers to move away from the doors the new cars will have longitudinal seats on one side and cross seats on the other instead of cross seats in the center and longitudinal near the ends. The same sunburst will be painted on the dashers that is now used in Brooklyn to indicate front-entrance cars. The detailed specifications of these cars follow:

Date order was placed.....Dec. 23, 1924
Date of delivery—Commencing April, 1925
Builders of car body:

150 Brill,
100 St. Louis,
85 Osgood-Bradley.

Type of car.....Front entrance,
center exit, pay as you pass

Seating capacity.....50
Weight:

Car body.....21,245 lb.
Trucks.....11,000 lb.
Equipment.....8,755 lb.
Total.....41,000 lb.

Bolster centers, length.....21 ft. 6 in.
Length over all.....44 ft. 0 in.

Truck wheelbase.....5 ft. 4 in.
Width over all.....8 ft. 4 in.

Height, rail to trolley base.....10 ft. 9 in.
Body.....Steel, 0.25 copper bearing

Interior trim.....Cherry
Headlining.....Agasote and Nevaspliff

Roof.....Arch
Air Brakes

Westinghouse Traction Brake Company
Armature bearings.....Bronze

Axles.....Heat-treated
Bumpers.....Hedley Anti-Climber

Car signal system.....Faraday buzzers
Car trimmings.....Statuary bronze

Center bearings.....Oil retaining
Side bearings.....Plain

Conduits and junction boxes.....Sherarduel
Control.....Safety Car Devices Company

Curtain fixtures.....National and Acme
Curtain material.....DuPont Fabrikoid

Destination signs.....Hunter
Door operating mechanism

National Pneumatic and Consolidated
Fare boxes.....Johnson

Wheelguards.....Root
Gears and pinions.....Nuttall

Hand brakes.....Peacock
Heater equipment.....Gold

Headlights.....Crouse-Hinds
Journal bearings.....Plain

Journal boxes.....Cast steel
Lightning arresters.....Type M. P.

Motors.....Four Westinghouse 510 A.
inside hung

Paint.....Devco & Reynolds
Power-saving device.....Arthur

Registers.....International
Sanders.....Ohio Brass

Sash fixtures.....Dayton
Seats:

150 Brill,
100 St. Louis,
85 Heywood-Wakefield.

Seating material.....Cherry slat
Slack adjuster.....Type J

Step treads.....Feralun
Trolley catchers.....Ohio Brass

Trolley base.....Ohio Brass
Trolley wheels.....Columbia

Trucks:
310 pairs Brill,
25 pairs St. Louis.

Ventilators.....Railway Utility
Wheels.....26-in. rolled steel

Track and Line

Wisconsin Railway, Light & Power Company, Milwaukee, Wis., will merge the Myrick Park and Market Street lines by building cross-over tracks running north and south at Third and Main and Fourth and Main Streets in La Crosse. Work on this improvement will begin as soon as weather conditions will

allow for the laying of new track: The plan is to eliminate the perplexing traffic problem in the downtown section.

Stockton Electric Railroad, Stockton, Cal., has applied to the Railroad Commission for a certificate to exercise a franchise granted by the city of Stockton and to construct, maintain and operate an extension to serve the Fair Oaks district in the city of Stockton. The district is not now served by any railway.

Nashville Railway & Light Company, Nashville, Tenn., spent more than \$500,000 during 1924 for extensions and additions to property. Of this amount \$161,802 was used for reconstructing and improving tracks.

Power Houses, Shops and Buildings

Staten Island Rapid Transit Railway, New Brighton, S. I., has filed plans for the construction of a one-story local substation, near Sand Lane, estimated to cost \$18,000. The company will also build a one-story substation near the Old Town Road, Glasmere, to cost about \$16,000, and a similar station near James Street, Atlantic, to cost a like amount.

North Branch Transit Company, Bloomsburg, Pa., it is reported, suffered the loss by fire on Jan. 6 of its car-house, workshop and warehouse as well as cars, including the snow-fighting equipment. The loss is estimated at \$150,000.

Trade Notes

Gramm & Kincaid Motors, Inc., Lima, Ohio, has organized to manufacture a complete line of motor trucks and buses. The organizers are B. A. Gramm, motor truck builder, and R. M. Kincaid, recently vice-president and general manager of the Garford Motor Truck Company.

Mitchell-Rand Manufacturing Company, New York, N. Y., announces among the 1925 changes in the organization the following: W. B. Stevens, formerly of the sales department, has been made manager direct factory sales department. R. E. Dunne has joined the sales force. He was for several years assistant manager of the New York Office of the Hope Webbing Company.

Truscon Steel Company, Youngstown, Ohio, has announced that Oscar W. Loew will assume charge of the advertising and sales promotion work effective February. Mr. Loew has had a wide experience in merchandising and marketing.

Union Switch & Signal Company, Swissvale, Pa., has received an order from the Pacific Electric Railway for materials for the installation of automatic block signaling through its Hollywood-Glendale Subway, Los Angeles, Cal., embracing 14 style "N" color light signals, with the necessary impedance bonds, a.c. relays and transformers for their control. In connection with this signaling, a new Union type "F" elec-

tric interlocking is being installed at the Fourth and Hill Streets terminal, Los Angeles. This plant will involve a 15-lever frame interlocking machine with the layout, including three single switches and four double slips, all of which will be operated by style "M" switch movements using 110-volt, 50-cycle alternating current. The Union Switch & Signal Company will furnish the materials and the field installation will be made by the railway company's signal construction forces.

Sangamo Electric Company, Springfield, Ill., has opened a direct sales office in Boston, Mass., in charge of Stafford J. King, who for the past 12 years has been the Sangamo sales engineer located in the New England territory. He will be assisted by W. H. Carpenter and R. D. Savage, who are at present also located in that territory. Leonard G. Hunt has been transferred to Boston to be associated with Mr. King. Both prior to and subsequent to his graduation from the University of Illinois Mr. Hunt was associated with the company, and for the last 3 years has been a district sales engineer with headquarters at the factory. A stock of meters and accessories has been placed in Boston to render adequate service in the New England territory.

New Advertising Literature

Heine Boiler Company, St. Louis, Mo., has issued a 35-page illustrated pamphlet entitled "Heine Longitudinal-Drum Boiler." The booklet is known as Bulletin No. 52.

Conveyors Corporation of America, Chicago, Ill., has issued a new bulletin describing the American high duty conveyor equipment of the steam jet type for handling ashes from power houses where machinery with large capacity is necessary. The company states that this conveyor is in successful operation in a number of large, well designed plants. The pamphlet contains 10 pages. It is illustrated.

General Electric Company, Schenectady, N. Y., has issued a 127-page volume called the Arc Welding and Cutting Manual. It is designated Y-2007. The volume is profusely illustrated. It is divided into three parts, the first devoted to general information on arc welding, the second to a training course for operators, and the third giving a number of applications of arc welding.

Foamite-Childs Corporation, Utica, N. Y., has issued "Correct Protection Against Fire," a 24-page booklet. The booklet is a popular treatise on fire protection for all sorts of risks, written in non-technical terms. The "A," "B" and "C" classifications of fires made by the Underwriters' Laboratories are defined and the proper safeguards for each class of fire are charted. This chart is a novel feature of the Foamite-Childs booklet. The text covers the characteristics of all the different extinguishing agents in detail. The size and type of extinguishers most suitable for use in the home, motor car, and all classes of industrial and institutional risks are illustrated and described in detail.

Five good reasons why PEACOCK Staffless Brakes are best



1— Braking Power

At least three times as powerful as any ordinary type hand brake, the motorman's effort is most rapidly and effectively converted into braking power.

2— Chain-winding Capacity

Ample space to wind up all the chain without jamming or binding. An excess of slack cannot put this brake out of commission.

3— Platform Space

Designed to occupy minimum platform space. It projects only six inches into the vestibule from the dash. This feature is especially valuable in view of the narrow entrance and exit facilities of the safety car.

4— Simplicity of Operation

Motormen like the Peacock Staffless—it is easy to understand, simple to operate and always dependable.

5— Lowest Maintenance

Repair bills are practically nil. The Peacock Staffless Brake is so simple and so rugged that there is little or nothing needed to keep it in repair.



**PEACOCK
STAFFLESS
BRAKES**

National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative:

Lyman Tube & Supply Company, Limited, Montreal, Canada

Bankers and Engineers

Ford, Bacon & Davis Incorporated Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation

Engineers—Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

EXAMINATIONS REPORTS APPRAISALS
ON

INDUSTRIAL AND PUBLIC SERVICE PROPERTIES

NEW YORK

BOSTON

CHICAGO

THE BEELER ORGANIZATION

ENGINEERS AND CONSULTANTS

Traction-Traffic-Equipment-Power

COORDINATION OF SERVICE—IMPROVED OPERATIONS

INCREASED TRAFFIC—FINANCIAL REPORTS

APPRAISALS—MANAGEMENT

52 Vanderbilt Ave.

New York City

SANDERSON & PORTER ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT and POWER PROPERTIES

CHICAGO

NEW YORK

SAN FRANCISCO

ENGELHARDT W. HOLST

Consulting Engineer

Appraisals, Reports, Rates, Service Investigation,
Studies on Financial and Physical Rehabilitation
Reorganization, Operation, Management

683 Atlantic Ave., Boston, Mass.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS—APPRAISALS—RATES—OPERATION—SERVICE

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly Pass—Differential Fares
Ride Selling

143 Crary Ave., Mt. Vernon, N. Y.

J. ROWLAND BIBBINS

Engineer—2301 Connecticut Ave., N. W. Washington, D. C.

TRANSPORTATION SURVEYS

Organized Traffic Relief and Transit Development
Co-ordinating Motor Transport, Railroad and City
Plans, Service, Routing, Valuation, Economic Studies

EXPERIENCE IN 20 CITIES

DAY & ZIMMERMANN, INC. ENGINEERS

DESIGN - CONSTRUCTION - REPORTS

VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

STEVENS & WOOD, INC.

Design and Construction of Power Stations

Railroad Electrification, Industrial Plants

REPORTS AND APPRAISALS

Management and Financing of Utilities and Industrials

Mahoning Bank Bldg.

120 Broadway

Youngstown, O.

New York

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells

Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management Operation Construction

43 Cedar Street, New York City

JAMES E. ALLISON & CO.

Consulting Engineers

Specializing in Utility Rate Cases and
Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.

HUMAN ENGINEERING

Railway Audit and Inspection Company, Inc.

Franklin Trust Building, Philadelphia

Boston New York { BRANCHES } Baltimore Atlanta
New Orleans Pittsburgh { Chicago St. Louis

Dwight P. Robinson & Company

Incorporated

Design and Construction of

Electric Railways, Shops, Power Stations

125 East 46th Street, New York

Chicago Youngstown Atlanta Philadelphia
Los Angeles Montreal Rio de Janeiro

KELLY, COOKE & COMPANY

Engineers

149 BROADWAY
NEW YORK

424 CHESTNUT STREET
PHILADELPHIA

AMERICAN BRIDGE COMPANY

EMPIRE BUILDING, 71 BROADWAY, NEW YORK

Manufacturers of Steel Structures of all classes, particularly
BRIDGES AND BUILDINGS

SALES OFFICES:

NEW YORK, N. Y. Empire Bldg., 71 Broadway	St. Louis, Mo., Liberty Central Trust Bldg., 506 Olive St.
Philadelphia, Pa., Widener Bldg., N. W. Cor. Chestnut and Juniper Sts.	Denver, Colo., First National Bank Bldg., 820 17th St.
Boston, Mass. 120 Franklin St.	Salt Lake City, Utah, Walker Bank Bldg., 175 S. Main St.
Baltimore, Md., Continental Bldg., Cor. Calvert and Baltimore Sts.	Duluth, Minn. Wolvin Bldg., 229-31 West 1st St.
PITTSBURGH, PA. Frick Bldg., 440 Fifth Ave.	Minneapolis, Minn. 629 2nd St., S. E.
Cincinnati, Ohio Union Trust Bldg., 36 East 4th St.	
Cleveland, Ohio, Rockefeller Bldg., 614 Superior Ave., West	
Detroit, Mich. Beecher Ave. and M. C. R. R.	
CHICAGO, ILL. 208 South LaSalle St.	

Export Representative: United States Steel Products Co., 30 Church St., N. Y.

JOE R. ONG

Consulting Transportation Engineer

*Specializing in Traffic Problems and in Methods to
Improve Service and Increase
Efficiency of Operation*

PIQUA, OHIO

C. B. BUCHANAN
President

W. H. PRICE, JR.
Sec'y-Treas.

JOHN F. LAYNG
Vice-President

BUCHANAN & LAYNG CORPORATION

*Engineering and Management, Construction,
Financial Reports, Traffic Surveys
and Equipment Maintenance*

BALTIMORE
825 Equitable Bldg.

Phone:
Hanover 2142

NEW YORK
49 Wall Street

THE P. EDWARD WISH SERVICE

40 Church St. Street Railway Inspection 131 State St.
NEW YORK DETECTIVES BOSTON

When writing the advertiser for information or
prices, a mention of the Electric Railway
Journal would be appreciated.

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.

Engineers and Contractors SYRACUSE, N. Y.

A. L. DRUM & COMPANY

Consulting and Constructing Engineers
VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE
COMMISSIONS
CONSTRUCTION AND MANAGEMENT OF
ELECTRIC RAILWAYS
230 South Clark Street 215 South Broad Street
Chicago, Ill. Philadelphia, Pa.

Bureau of Commercial Economics, Inc. Industrial Engineers

Organization • Methods • Layout and Facilities
Public and Industrial Relations
72 West Adams Street • CHICAGO

The Most Successful Men in the Electric Railway
Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week



Part of the fleet of 23 busses operated by the Pennsylvania-Ohio Coach Lines Company, of Youngstown, Ohio, in interurban service. General Cords are used exclusively.



Five of a fleet of 50 city-type busses operated by the P. & O. Coach Lines Company, in Youngstown and Warren, Ohio, and New Castle, Pa. All on General Cords.

P. & O. Coach Line Busses Ride on General Cords

Two fleets, totaling 73 busses, 100% General Cord equipped. "No annoyance or bother from the tire question," writes R. N. Graham, Manager.

Nearly two years' experience with General Cords on two separate fleets have proved to the owners of the Pennsylvania-Ohio Coach Lines Company, of Youngstown, Ohio, that 100% General Cord equipment assures the lowest possible tire cost-per-mile.

This company operates 50 city-type busses at Youngstown and Warren, Ohio, and New Castle, Pa., and 23 De Luxe busses on its interurban routes. Both fleets ride on General Cords exclusively. These paragraphs, from a letter by Mr. R. N. Graham, tell why:

"Our service is remarkably free from interruptions. We have no annoyance or bother from the tire question. The mileages we are receiving from individual tires are more than our original estimates.



—goes a long way
to make friends

"After nearly two years' experience, I have no hesitation in unqualifiedly recommending the General Cord for coach, stage and bus service, and no hesitation in recommending The General Tire and Rubber Company in responsibility, efficiency and keen co-operation in everything that tends to render automotive transportation successful."

Riding on less inflation—and with less internal wear—the General Cord cushions the bus against jolts and jars, assuring more comfortable transportation and fewer lay-ups for costly repairs.

In addition, General's unusually low rolling-resistance assures a tremendous saving in power and gasoline consumption.

Ask any fleet operator who standardizes on Generals.

The
GENERAL
CORD.

BUILT IN AKRON, OHIO, BY THE GENERAL TIRE AND RUBBER COMPANY



St. Louis Built- *Ever-Wear* STEEL BODIES *for Street Railways-*

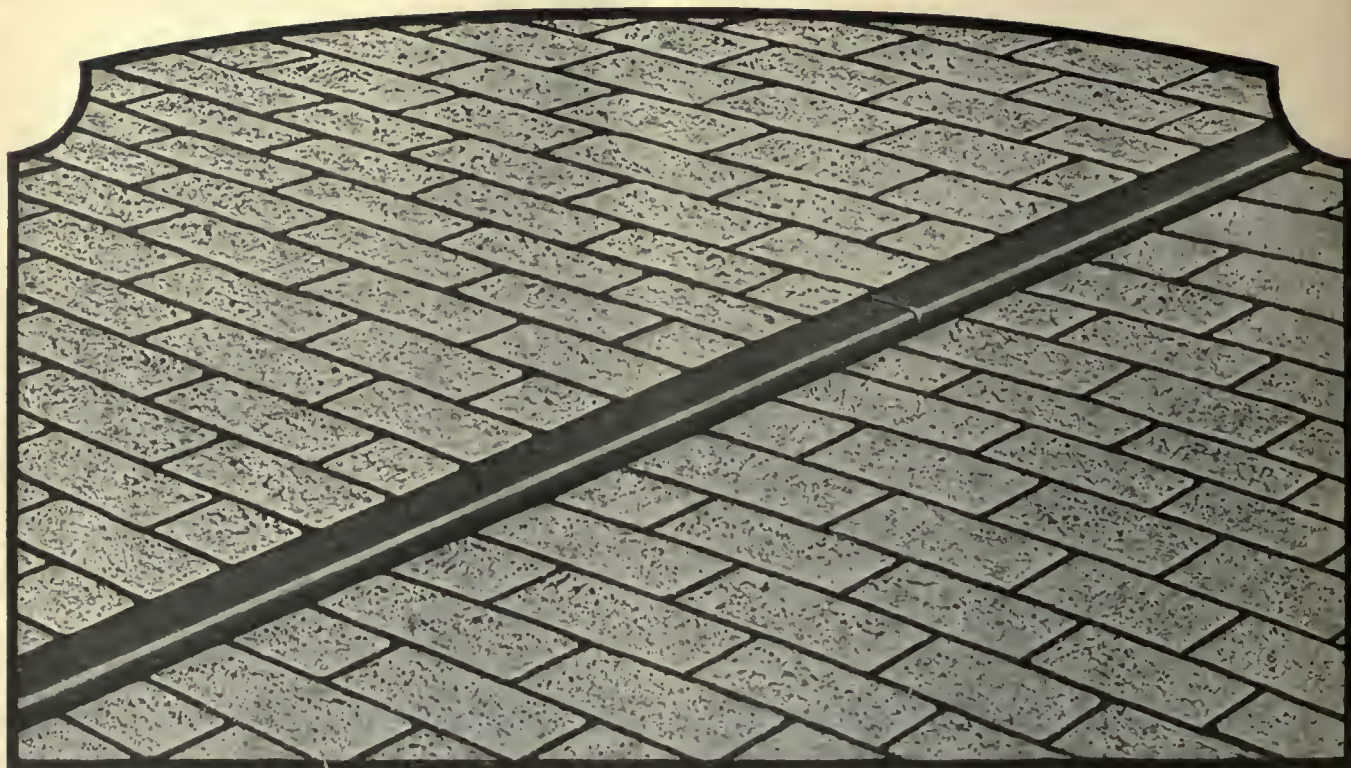
Built for long life in ordinary service, they incorporate our pioneer experience in the building of every type of street railway car. No detail has been overlooked which would give greater comfort while losing nothing in practical "workworthiness."

The illustration shows a 29 passenger steel body recently built for the Houston Electric Company.

St. Louis "Ever-wear" steel bodies are built for street railway companies and conform to the most exacting standards of good railway practise—not having the limitations of bodies built without experience because of the rapid expansion of the Bus Body Industry.

Consult us on your specific requirements. We'll be glad to advise and give quotations. Details sent on request.

St. Louis Car Company
St. Louis, Mo.



Six-Point-Service—

I

absorbs impact
at rail joints

II

water-seals
road-bed and
ties

III

allows for con-
traction and
expansion.

VITRIFIED brick, as-
phalt-filled, is the *only*
surfacing material which
withstands impact and ab-
rasion indefinitely, water-
seals your road-bed and is
easily removable for track
repairs with 100% salvage.

VITRIFIED
Brick
PAVEMENTS

IV

resists heaviest
traffic

V

is easily re-
movable for
track repairs

VI

practically
100% salvage
value

O U T L A S T T H E B O N D S

NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION, ENGINEERS BLDG., CLEVELAND, OHIO

Alton Brick Company
Alton, Ill.
Binghamton Brick Company
Binghamton, N. Y.
Central Clay Products Co.
(Distributors MACK Paving Brick)
Wilkes-Barre, Pa.
Cleveland Brick & Clay Company
Cleveland, Ohio
Clydesdale Brick & Stone Co.
Pittsburgh, Pa.
Coffeyville Vitrified Brick & Tile Co.
Coffeyville, Kans.
Collinwood Shale Brick Company
Cleveland, Ohio
Francis Vitric Brick Company
Boynton, Okla.

Georgia Vitrified Brick & Clay Co.
Augusta, Ga.
Globe Brick Company
East Liverpool, Ohio
Hyslvania Coal Co.
Columbus, Ohio
Hocking Valley Brick Company
Columbus, Ohio
Independence Paving Brick Co.
Independence, Kans.
Metropolis Paving Brick Co.
Pittsburg, Kansas
Metropolitan Paving Brick Co.
Canton, Ohio
Mineral Wells Paving Brick Co.
Mineral Wells, Texas

Moberly Paving Brick Company
Moberly, Mo.
Murphysboro Paving Brick Co.
Murphysboro, Ill.
Nelsonville Brick Co.
Nelsonville, Ohio
Peebles Paving Brick Company
Portsmouth, Ohio
Parington Paving Brick Company
Galesburg, Ill.
Southern Clay Mfg. Company
Chattanooga, Tenn.
Springfield Paving Brick Company
Springfield, Ill.
Sterling Brick Company
Olean, N. Y.

Streator Clay Mfg. Company
Streator, Ill.
Thornton Fire Brick Co.
Clarksburg, W. Va.
Thurber Brick Company
Ft. Worth, Texas
Toronto Fire Clay Company
Toronto, Ohio
Trinidad Brick & Tile Company
Trinidad, Colo.
Veedersburg Paver Company
Veedersburg, Ind.
Western Shale Products Company
Fort Scott, Kans.
Westport Paving Brick Company
Baltimore, Md.



Chicago, North Shore,
Milwaukee R. R.



Hudson Valley Ry. Co.



Portland-Lewiston
Interurban

A few outstanding examples
of the many high-class roads

using

MILLER TROLLEY SHOES

(Patented)

Well-known leading roads, noted for efficient and economical management, use Miller Trolley Shoes. There are dozens of them, all over the country, from Coast to Coast.

Miller Trolley Shoes have long since passed the trial stage on these roads. They have been "*standard equipment*" for five or more years.

Any equipment of such standing is worthy of your most earnest consideration. There's economy in it for you.

Miller Trolley Shoe Co.
Boston-21, Mass.

Pacific-Northwest Traction Co.

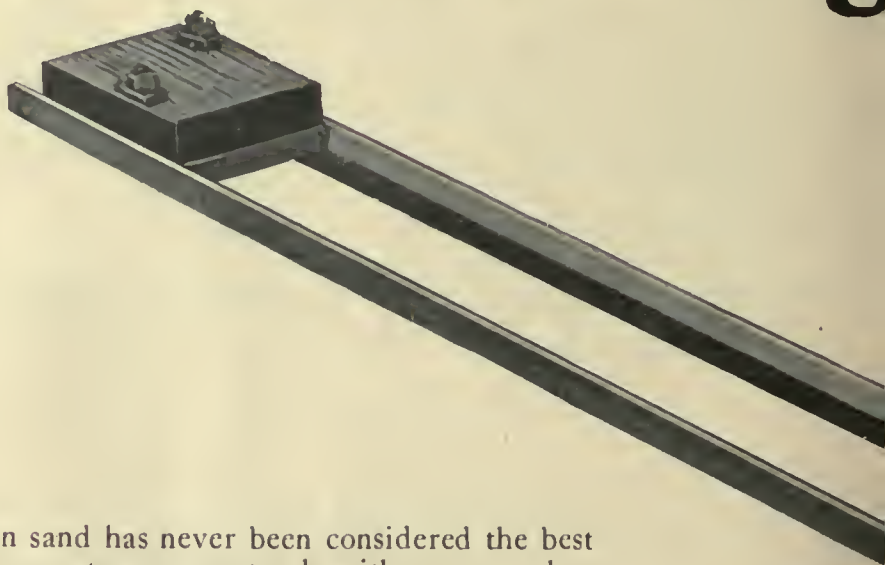
Knoxville Ry. & Lt. Co.



Waterloo, Cedar Falls
& Northern Ry. Co.



Why Put a Under a Long



Building a house on sand has never been considered the best practice. Sealing up a temporary track with more or less permanent paving, is hardly any better.

The troubles in store for those who are guilty of this type of track construction need not be enumerated. They will be manifest soon enough.

Surely, the logical thing to do is to put a permanent track beneath a permanent pavement.

Dayton Resilient Ties imbedded in concrete make as nearly permanent track construction as it is humanly possible to build at this time. The resilient feature not only reduces upkeep on rolling stock, but prevents disintegration of the concrete foundation also.

DAYTON

Short-lived Track Lived Pavement?

The Dayton Resilient Tie is the one practicable solution of the problem of how to make the track as durable as the paving.



The Dayton
Mechanical Tie Co.

707 Commercial Building, Dayton, Ohio

Canadian Representative:

Lyman Tube and Supply Co., Ltd., Montreal, Quebec

Resilient TIE

"SHELBY"

SEAMLESS STEEL

TROLLEY POLES

Reinforced where reinforcement is needed, without adding superfluous weight or sacrificing resiliency.



THE standard "SHELBY" Poles are made from 13 gage material, as years of practical experience have shown that a lighter gage may fail by local injuries, and a heavier gage simply adds to the weight of the pole without increasing its strength to a corresponding extent. The theoretical requirement for a pole of minimum weight points out a method for increasing the strength of the pole without a proportionate increase in the weight. This method consists of the use of a reinforcement at the base end and on the inside of the 13 gage member.

These poles are made by improved methods of manufacture, particularly in the method of inserting the reinforcement. The reinforcement is integral with the body of the pole, which adds materially to its efficiency.


Ask for Booklet—The "SHELBY" Seamless Cold Drawn Steel Trolley Pole.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.
GENERAL SALES OFFICES: FRICK BUILDING

DISTRICT SALES OFFICES

Atlanta Boston Chicago Denver Detroit New Orleans New York Salt Lake City Philadelphia Pittsburgh St. Louis St. Paul
 Pacific Coast Representatives: U. S. Steel Products Co. San Francisco Los Angeles Portland Seattle
 Export Representatives: U. S. Steel Products Co. New York City

SPAIN Says:

T. S. Q. means this 

de la Concepción y algunas en la Ciudad Lineal.
Material móvil.—Muy importante, tanto como necesaria,
ha sido la renovación de piezas, mereciendo especial mención
el importante suministro hecho por los Talleres de Deusto de
piezas para los trucks; los engranes, piñones de acero especial
de la más acreditada marca en el mundo, «Tool steel»; un
hogar de cobre de la casa alemana Orenstein y T.

Translation "Very important and necessary has been the purchase of repair parts and we make special reference to the gears and pinions of the most famous make in the world, the "Tool Steel."

A large company in Spain, in its annual report to stockholders, commenting on its financial showing and *good management*, includes the above paragraph.

"Tool Steel" Quality T. S. Q. "Tool Steel" Quality

Tool Steel Gear and Pinion Co.
 Cincinnati, Ohio



Collier Service

A nation-wide
organization
building and
sustaining car
card advertising
space values



Barron G. Collier, Inc.

Candler Bldg.
New York

Standard Lubricants will Reduce Friction Losses

IT will be to your advantage to use only Standard Oil Company (Indiana) Oils and Greases to lubricate each machine and bearing throughout your entire plant. From this one source you can obtain every kind and grade of lubricant you need for their proper lubrication and in any quantity.

These lubricants are made from crude oils selected especially because of their superior lubricating qualities. The experience of more than thirty years of oil refining and the thought of many of the foremost lubrication engineers in the country enter into the refining of these crude oils and into the production of the line of Standard Oils and Greases.

They are made to meet the exacting lubrication requirements of every kind of machine. The right Standard lubricant, used in the right place, will bring about greatly improved operating conditions and effect important economies. They will assuredly reduce loss of power by greatly reducing friction.

Standard Oils and Greases

are of highest quality and absolute uniformity. Each is made to meet exactly some specific lubricating need and when the proper lubricant is selected and properly used, it renders the fullest measure of satisfaction and service.

To be absolutely certain that the most economical lubricants will be used, we have placed at your service our staff of lubricating engineers. One of these engineers will help you in every way possible at any time you may call. Their technical knowledge of lubricants and lubricating problems and their broad practical experience enables them to render a service of inestimable value to you. No charge is made for this service.

A 'phone call or letter to our nearest branch will get results

STANDARD OIL COMPANY

(INDIANA)

General Offices: 910 S. Michigan Avenue, Chicago, Illinois

ILLINOIS	INDIANA	IOWA	MICHIGAN	WISCONSIN	MISSOURI
Chicago	Evansville	Davenport	Detroit	La Crosse	Kansas City
Decatur	Indianapolis	Des Moines	Grand Rapids	Milwaukee	St. Joseph
Joliet	South Bend	Mason City	Saginaw	MINNESOTA	St. Louis
Peoria	KANSAS	Sioux City	N. DAKOTA	Duluth	
Quincy	Wichita	S. DAKOTA	Fargo	Mankato	
		Huron	Minot	Minneapolis	





Your best protection—

BOYERIZE

Looking over the Injuries and Damages figures of the big fellows, we see that it runs anywhere from 3 to 7 per cent of the gross income. Means as much as \$3.00 per every 1000 passengers carried.

It's not the platform and step accident any more that makes the biggest hole in the I. & D. pocketbook; it's the run-down, the collision, the bump into valuable property and still more valuable humanity.

Boyerized brake-rigging cuts that kind of accident down. Stands to reason that it must, because Boyerized brake-pins and bushings wear ever so much longer than any other kind you get—and the longer they wear the less chance they give to the brake-rigging troubles that put your cars beyond control.

**STAG
BRAND
MANGANESE
BRAKE PINS**

They are Boyerized

Let us quote on your requirements.

BEMIS CAR TRUCK COMPANY

*Electric Railway Supplies
Springfield, Mass.*

REPRESENTATIVES:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.

W. F. McKenney, 54 First Street, Portland, Oregon.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.



Standard Varnishes and Colors— for transportation service—

For many years the name *Beckwith-Chandler* has stood for the highest quality finishes for steam and electric railway cars. The durability of these products under severe operating and climatic conditions has been proved by the experience of many of the leading railroads of the country.

There are specific Beckwith-Chandler products for every part of the car—exterior, interior, roof, headlining, cane seats, floor and trucks. We can supply finishes in the flat color and varnish systems, enamel systems or color varnish systems.

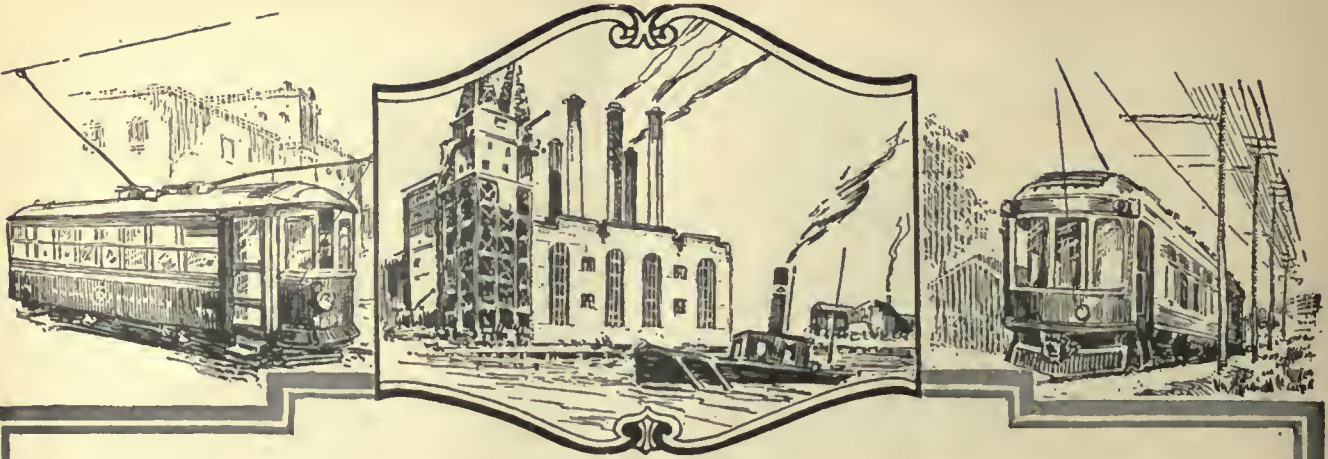
NEOLITE—the new Pyroxylin finish is another Beckwith-Chandler development. Make Beckwith-Chandler products your paint shop standard.

BECKWITH-CHANDLER COMPANY

Manufacturers of Highest Grade Varnishes

320 Fifth Avenue, New York, N. Y.

203 Emmett St., Newark, N. J.



Ask the Power Plant Man— *He'll tell you!*

That even perfect rolling stock won't run unless backed up by real service from the Power Plant.

If the turbines stop, the power stops. A faulty reciprocating engine will cause all kinds of trouble.

Yes, the Power Plant must operate perfectly. And this requires the best in Power Plant Lubrication.

Texaco Turbine Oils, Texaco Engine Oils, Texaco Steam Cylinder Oils, Texaco Greases—these products are insuring to many electric railway companies superior Power Plant Service.

What Texaco Lubricants have accomplished for others in Power Plant lubrication, they will accomplish for you—efficiency and economy.

Provide your Power Plant with Texaco Lubricants—and see the difference!

There is a Texaco Lubricant for Every Purpose.



THE TEXAS COMPANY
DEPT. R-J · 17 BATTERY PLACE · NEW YORK CITY
HOUSTON · CHICAGO · NEW YORK
OFFICES IN PRINCIPAL CITIES





Station CCH broadcasts
economy in current consumption for
car heating

This is station CCH broadcasting direct from our factory at Albany. Our talk to-day is on the pertinent subject of up-to-date heater regulation.

Consolidated Visible Thermostats

WATCH DOGS of current consumption and guardians of passenger comfort, these little devices are now recognized as one of the most forward steps in the modernization of electric railway practices.

By means of the thermostat principle, they turn heating current on and off automatically, maintaining the car at any pre-determined temperature.

Furthermore—being enclosed in a crystal-clear heavy glass casing, Consolidated Visible Thermostats are fool-proof and tamper-proof, and show at a glance that they are working.

Waste of current, overheating cars, is entirely

eliminated. No attention necessary from platform men.

Consolidated Electric Car Heaters (26 different types of Consolidated Electric Car Heaters have been inspected and approved by the Underwriters Laboratories maintained by the National Board of Fire Underwriters) in connection with Consolidated Visible Thermostatic Control, afford a most economical system of car heating.

Station CCH now signing off until next week when another interesting program will be broadcast.

Good day!



CONSOLIDATED CAR HEATING COMPANY
ALBANY, N. Y.

More-Jones quality products have for years effectively demonstrated the skill of manufacture behind them

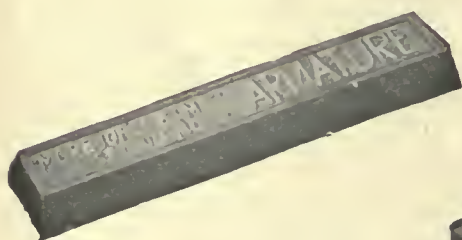
For the sake of your service, your investment, and your interests, why not come to More-Jones for these products that have a definite standard of quality. More-Jones have successfully developed certain features in their products that have proven their great worth in the test of service and time.

More-Jones Brass & Metal Company
St. Louis, Mo.



M-J Lubricated and V-K Oilless Trolley Wheels and Non-Arcing Harps

The pure, new metal used in the wheels is exceedingly tough, yet does not grind away the metal of the wire. Perfect lubrication is accomplished in the V-K automatically.



M-J Armature Babbitt

Accepted standard for railway armature bearings. Scientifically compounded of pure new tin, copper, antimony and metallo nickel—no lead. Lasts much longer and guaranteed most economical.



"Tiger" Bronze Axle and Armature Bearings

Their exceptional toughness and high anti-frictional qualities insure great strength and slow, even rate of wear.



MORE-JONES QUALITY PRODUCTS



ORANGEBURG FIBRE CONDUIT

—for thirty years the most reliable form of underground duct line construction.

JOHNS-MANVILLE

Sole Selling Agent for

The Fibre Conduit Company, Orangeburg, N. Y.

JOHNS-MANVILLE, Inc.
292 Madison Avenue, at 41st Street, New York City
Branches in 62 Large Cities
For Canada CANADIAN JOHNS-MANVILLE CO., Ltd., Toronto



A clear
practical
manual
on
Substation
Operation

Just
Published

For the beginner, helper, assistant operator and operator who wants the complete facts on substation operation in a clear, practical, non-technical way, there is no better book than—

KURTZ'S SUBSTATION OPERATION

By Edwin Kurtz

Assistant Professor of Electrical Engineering, Iowa State College, formerly with The Milwaukee Electric Railway and Light Company.

261 pages, 5½x8, \$2.50 net, postpaid.

In this book the principles and methods of substation operation are explained plainly and thoroughly. With a little study and application of the principles outlined to the reader's daily work, he should be able to acquire a knowledge and understanding of the fundamentals of operating work in a short time, which otherwise might take months and perhaps years to acquire.

Every phase of substation operation from layout to keeping records

is covered in this complete, handy, reference book.

It aims to give the beginner and also the experienced operator a thorough knowledge and understanding of

- the fundamental principles of substation practice
- the methods of operation
- the proper use and care of operators' safety equipment
- the use made of station readings and records and of how operating results are calculated from them
- station layout and wiring
- the functions and operating procedure of machine and auxiliary apparatus

The last chapter of this book lists 461 questions used by six representative power companies to determine whether a man is qualified to operate a substation and whether such an operator is entitled to promotion. This chapter alone is well worth the small cost of the book.

See this practical book for 10 days FREE.

Just clip and send in the coupon

McGraw-Hill FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York.

You may send me on 10 days' approval Kurtz's Substation Operation, \$2.50 net, postpaid. I agree to remit for the book or to return it postpaid within 10 days of receipt.

Signed

Address

Official Position

Name of Company

(Books sent on approval to retail purchasers in U. S. and Canada only.)

M 1-17-25



H-W Bus seat comfort keeps step with
Touring Bus development



Tourease No. 8-C-5



Elec. Ry. Seat



Driver's Seat



Steam R. R. Seat

The H-W "Tourease" A Bus-seat Sensation

IN the design and construction of the new H-W "Tourease," ninety-nine years of seat-building experience has been centered. Here is a real bus-seat achievement.

Backs are either 19 or 22 inches high, designed to allow ample knee room *without sacrifice of spring depth*. Cushions are extra wide and deep, of double spring construction — "comfy" springs over wire-top spring work. As easy as an overstuffed chair. The one-piece frame is unusually sturdy. Pedestal ends have wide-flanged floor castings with double supporting arms welded to full length pressed steel cushion and back supports.

Whether or not your "length of haul" demands these extremes of passenger comfort, the complete H-W line is certain to contain the seat best suited to your needs. Freely consult our passenger-seating experts on your particular requirements.

HEYWOOD-WAKEFIELD COMPANY

HEYWOOD-WAKEFIELD CO.
1359 Railway Exchange Building, Chicago, Ill.

HEYWOOD-WAKEFIELD CO.
516 W. 34th St., New York

HEYWOOD-WAKEFIELD CO.
Monadnock Bldg., San Francisco

F. N. GRIGG
630 Louisiana Ave., Washington, D. C.

THE G. F. COTTER SUPPLY CO.
Houston, Tex.

THE RAILWAY AND POWER ENGINEERING CORP'N
Montreal and Toronto, Canada

Heywood-Wakefield

REG. U.S. PAT. OFF.

SLEET CUTTING DEVICES



Nuttall Sleet Wheels replace the standard trolley wheels and efficiently clean sleet coated wires



Nuttall Sleet Scrapers hook over the trolley wheel — can be attached instantly, and clean the wire thoroughly. Don't wait for a sleet storm — order today.

R.D. NUTTALL COMPANY

PITTSBURGH  PENNSYLVANIA

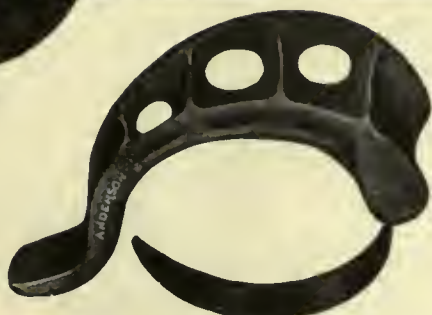
All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

TRADE



ANDERSON

MARK



SLEET CUTTER
Cat. No. 18847



SLEET WHEEL
Cat. No. 18846

Order Your Sleet Cutters, NOW

We can ship practically any quantity of Sleet Wheels or Cutters you may want, direct from stock.

But why wait until the last minute? The time to put on Sleet Wheels and Cutters is when the wire is thick with ice—and that might be any day, now.

Look over your stock and see if you have enough Cutters to take care of your needs, should a sudden sleet storm arrive.

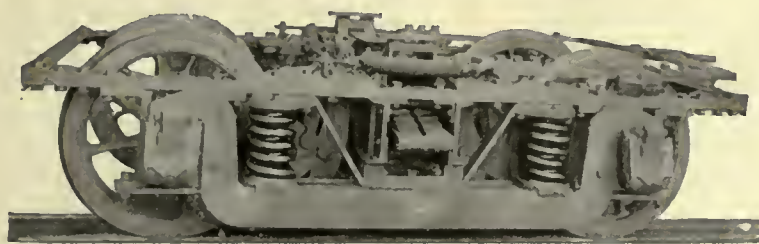
Estimate what you want now, to see you through and write for quotations on your full winter's supply.

Albert & J. M. Anderson Mfg. Co., 289-305 A St., Boston, Mass.

New York—135 Broadway
Chicago—105 South Dearborn St.

Philadelphia—429 Real Estate Trust Bldg.
London, E. C. 2, England

Baldwin Improved Motor Trucks For Japanese Electric Railways



Built for Okazaki Electric Tramway Co., Ltd.

Gauge, 3 ft. 6 in.
Wheel base, 78 in.

Center pin load, 30,000 lb.
Wheels, diameter, 34 in.

AMONG recent orders received from Japanese Electric Railways for Baldwin Electric Motor Trucks, was one from the Okazaki Electric Tramway Co., Ltd., which operates a line in Aichi Pre-

fecture, between Kosei and Higashi Arako. The Trucks ordered were of our "A" type, with two double equalizing beams, angle iron end frames and inside hung motors.

Baldwin Trucks of this type meet the most severe conditions of high speed inter-urban and street railway service. Catalogs and full information upon request.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U. S. A.

Cable Address, "Baldwin, Philadelphia"

Chillingworth One Piece Gear Case

Made from deep drawn open hearth steel

40% lighter and more durable than malleable iron cases



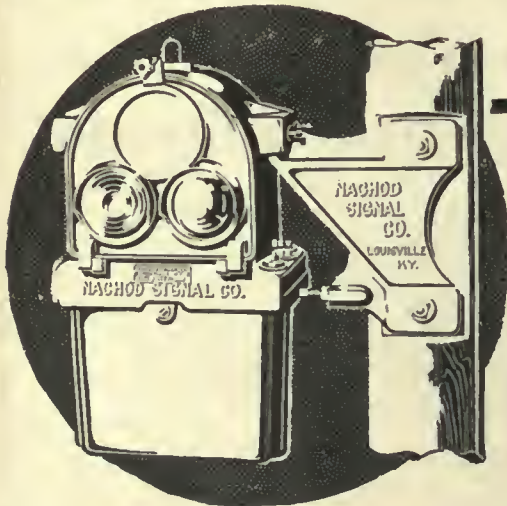
Built for Service

Chillingworth Manufacturing Co.

Jersey City, N. J.

Sold in Canada by Railway & Power Engineering Corp., Toronto, Montreal, Winnipeg.

Sold in England by Croyden Engineering Co., Ltd., Croyden.



—and
**NACHOD
HEADWAY
RECORDERS** —



N-A-C-H-O-D SPELLS SAFETY

“**B**ETTER be safe than sorry.” And it’s much cheaper also. One serious accident may entail more loss in settling damage claims, than an entire signal installation.

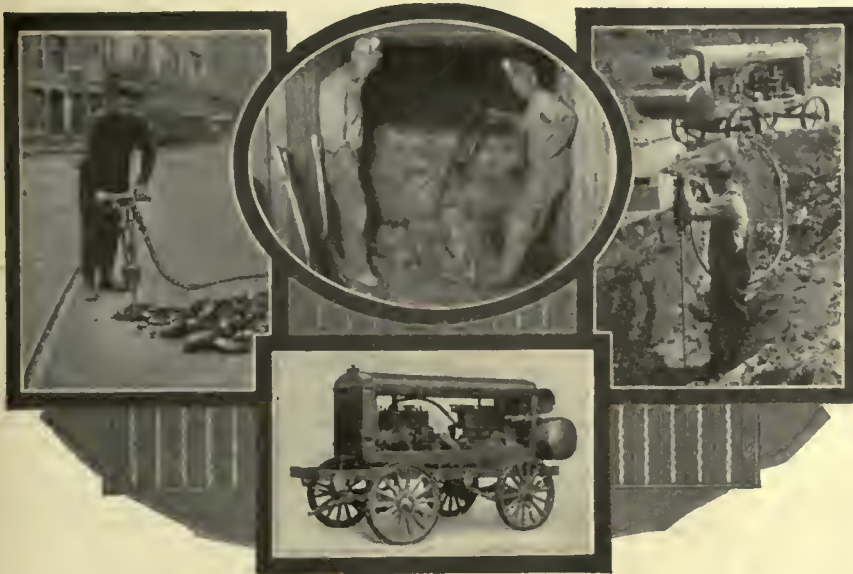
Nachod Automatic Block Signals are extremely simple to install, to operate and to maintain. They are controlled from overhead contactors and give duplicate indications of lights and disks, visible day or night, under any kind of weather conditions.

an efficient check on actual headways

Schedules may be ideal for the traffic requirements, but it’s the actual spacing and timing of cars on the road that counts with the public. With Nachod Headway Recorders, you secure actual operating data, 24 hours a day, at any points on your lines.

Know what your cars are doing

Nachod Signal Company, Inc.
Louisville, Kentucky



Speed up your 1925 road jobs by putting compressed air on your payroll.

In rock drilling of every kind; in tearing up pavement or tearing down existing structures; in digging clay or frozen ground, and in light hoisting tasks, you can save days and weeks by utilizing Sullivan Air Power Equipment.

Sullivan Portable Compressors are built

in 3 types, for gasoline engine, electric motor, and tractor drive.

Gasoline types are direct connected to Buda. 4-cylinder, 4-cycle engines. Standard trucks have steel wheels, but trailer-type trucks with spring suspension and rubber tires may be had; also skid mountings.

Capacities, 100 cu. ft. and upward. Distinguished by power economy, and excellent wearing qualities, embodying the experience of 15 years in building portable air compressors.

**"You can
do it
Quicker
with
Air"**

That's the title of our
new booklet on Portable
Compressor Jobs.

*Send for your copy
today*

Sullivan Mach'y Co.
150 So. Michigan Ave.
Chicago

Your Passengers Will Enjoy Their Ride On Hale-Kilburn Seats

Especially Designed for
One Man Safety Cars

**Lightest
Strongest
Simplest
Neatest**



*Lightest
Weight
Stationary
Steel Seat*



*Lightest
Weight
Walkover
Steel Seat*

*No higher in price than others
Write for particulars*

Hale-Kilburn Company
PHILADELPHIA

New York
30 Church St.

Chicago
McCormick Bldg.

Richmond
Mutual Bldg.

Atlanta
Candler Bldg.

San Francisco
903 Monadnock Bldg.

Los Angeles
320 S. Pedro St.

Arc Weld Rail Bonds

AND ALL OTHER TYPES

Descriptive Catalogue Furnished

American Steel & Wire Company

Chicago
New York
Boston
Cleveland
Pittsburgh
Denver
U. S. Steel Products Co.
San Francisco

Los Angeles

Portland

Seattle



Reg. U. S. Pat. Office

Incandescent Lamp Cord

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE
AND CABLE

PAPER INSULATED
UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS PHILLIPSDALE, R. I.

Boston, 178 Federal; Chicago, 112 W. Adams;
Cincinnati, Traction Bldg.; New York, 100 E. 49th St.

Almco



SEND TODAY

for our new Publication

on

SAFETY

and

EFFICIENCY

in Electric Railway
Signals and
Crossing Bells

American Insulating
Machy. Co., Inc.

521 Huntingdon St., Philadelphia, Pa.

STANDARD Underground Cable Company

Electric Wires and Cables of Quality

Branch Offices:

Boston Philadelphia Pittsburgh St. Louis New York
Washington Chicago Detroit San Francisco

ANACONDA TROLLEY WIRE

ANACONDA COPPER
MINING COMPANY
Conway Building, Chicago, Ill.



THE AMERICAN
BRASS COMPANY
General Office: Waterbury, Conn.



PEIRCE Railway Feeder Pins

A strong Forged Steel Pin designed for heavy duty.
Their low cost permits their use over the entire
system.

HUBBARD & COMPANY
PITTSBURGH

CHICAGO



ELECTRICAL WIRES AND CABLES

John A. Roebing's Sons Company
Trenton, New Jersey

J-1707



U. S. ELECTRIC AUTOMATIC SIGNAL

for single track block signal protection

United States Electric Signal Co.
West Newton, Mass.

Chapman Automatic Signals

Charles N. Wood Co., Boston



Shaw Lightning Arresters

Standard in the Electric Industries
for 35 years

Henry M. Shaw

150 Coit St., Irvington, Newark, N. J.



ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed.
Up-to-date and economical.

Alumino-Thermic Corp., Roselle Park, N. J.

SPECIALISTS

in the

**Design and Manufacture
of
Standard—Insulated—and
Compromise Rail Joints**

**The Rail Joint Company
61 Broadway, New York City**

High-Grade Track Work

**SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE
CONSTRUCTION**

**New York Switch & Crossing Co.
Hoboken, N. J.**



*The Principle that established
solderless connectors as good
engineering.*

The more contact surface you get in a connection—the better the joint.

Because the tapered sleeve of the Dossert Connector gave engineers a means for securing large contact area held permanently tight—the solderless connector idea met with favor.

Today it is standard practice.

Write for the Dossert Catalog.

**Dossert & Company, New York
242 West 41st Street
H. B. LOGAN, President**

**DOSSERT
Solderless Connectors**

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of
Water Tube Boilers
of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building



WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 621-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguilar 104
SAN JUAN, PORTO RICO, Royal Bank Building

Cambria Forged Steel Electric Car Axles

To Meet Most Rigid Specifications



Other products for the electrical field includes wheels, armature shafts, rails, spikes, track work, splice bars, bolts, tie plates, tie rods, pole line material, sheets, magnet steel and gear blanks.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

BETHLEHEM

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa.

Sales Offices:

Atlanta Chicago Cleveland New York
Philadelphia Pittsburgh
Pacific Coast Representative:
United States Steel Products Company
Los Angeles Portland San Francisco Seattle
Export Representative:
United States Steel Products Company, New York, N. Y.

PERFECT MICANITE INSULATOR

Reg. U. S. Pat. Off.

ELECTRICAL INSULATION

Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

Catalogs will gladly be furnished

MICA INSULATOR COMPANY

Sole Manufacturers of Micanite

Established 1893

68 Church St., New York

542 So. Dearborn St., Chicago

Works: Schenectady, N. Y.

8-F

'CARNEGIE' for WHEELS AXLES RAILS CROSS TIES



Carnegie Steel Company
PITTSBURGH, PENNA.

BUDA ESTABLISHED 1881

Special Track Work of every
description

THE BUDA COMPANY

Harvey (Suburb Chicago) Illinois

DUNDEE "A" AND "B" FRICTION TAPES



are
Okonite
Products

'Nuff Said!



Write for Samples and Circulars

THE OKONITE CO., Passaic, N. J.

Incorporated 1884

Selling Offices: New York—Atlanta—Pittsburgh—San Francisco

Agents: Central Electric Co., Chicago, Ill.; Pettigell-Andrews

Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cin-

cinatti, Ohio; Novelty Electric Co., Philadelphia, Pa.

Canadian Representatives: Engineering Materials Limited, Montreal.



"Longwear" Pins and Bushings

Hard—Accurate—Uniform



Renewal Materials
for Peckham and
other Trucks

Castings—Forgings
Springs

E. G. Long Company

50 Church Street, New York, N. Y.

ALLIS-CHALMERS MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines,
Condensers, Gas and Oil Engines, Air Compressors,
Air Brakes

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

ECONOMIZERS

reduce fuel costs by making
use of waste exhaust gases
to preheat the boiler feed.
Patented construction proven
by 30 years of service.

FOSTER

SUPERHEATERS

improve engine, turbine and
boiler economy by enabling a
given amount of steam to do
more work. Over 10,000 in-
stallations in stationary power
plants.

POWER SPECIALTY CO.,

Boston, Phila., Pitta., Detroit, Kans. City, Chicago,
San Fran., Los Angeles, Boulder, Dallas, London

111 Broadway, NEW YORK

R. A. HEGEMAN, Jr., President
H. A. HEGEMAN, Vice-Pres. and Treas.
W. C. PETERS, Manager Sales and Engineering

C. C. CASTLE, First Vice-President
F. T. SAROENT, Secretary

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and
Change Maker
The Aluminum Field Coils
Walter Tractor Snow Plows
Cutler-Hammer Electric
Heaters
Pittsburgh Forge & Iron
Co.'s Products
Genesco Paint Oils
E. Z. Car Control Corpora-
tion's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s
Single and Double Deck
Buses

Economy Electric Devices
Co.'s Power Saving and
Inspection Meters
Anglo-American Varnish Co.,
Varnishes, Enamels, etc.
Gilmer Multiple Safety Step
Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co.,
Springs
Turnstile Car Corporation's
Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

THE WORLD'S STANDARD "IRVINGTON"

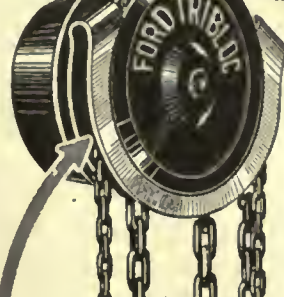
Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.
Irvington, N. J.

Sales Representatives in the Principal Cities

FORD TRIBLOC



Look for
the **Green**
Loop Guide

For the car shop

A quick, easy, but sure method of speeding up work in the car shop—and keeping your rolling stock on the road where it will bring in revenue—is to provide your men with Triblocs on the many lifting jobs inseparable from car shop work.

Send for Catalog 6-B

FORD CHAIN BLOCK COMPANY
2nd and Diamond Streets, Philadelphia, Pa.

CHAIN HOISTS

N-L Ventilators are Absolutely WEATHER PROOF



Rain! Snow! Cold, searching winds! Don't make your cars stuffy and uncomfortable this winter in order to keep them warm. *Assure yourself* that your passengers will be comfortable. N-L Ventilators will furnish adequate ventilation and are absolutely weather proof under all conditions. Many different designs for street car and bus use.

Write for our booklet,
"Superior Ventilation" for complete detail
and information



The Nichols-Lintern Co.

7960 Lorain Ave., Cleveland, Ohio

Canadian Representative: Railway & Power Eng. Corp., Ltd., Toronto, Ontario

NEW and RELAYING RAILS

1 TON or 1000

TRACK
EQUIP-
MENT

LB FOSTER CO.
PITTSBURGH - PENNSYLVANIA

RAIL
ACCESS-
ORIES

NEW YORK · JERSEY CITY · PHILADELPHIA · HAMILTON, O.

RAMAPO AJAX CORPORATION

Ramapo Automatic
Return Switch
Stands
for Passing
Sidings



RACOR Tee Rail
Special Work
Manganese
Construction

GENERAL OFFICES: HILBURN, NEW YORK

Chicago New York Superior, Wis. Niagara Falls, N. Y.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

HORNE & EBLING CORPORATION

50 CHURCH ST.,

NEW YORK, N. Y.

Brass Hardware
For Cars and Buses

Motor and Controller
Parts



Sterling Trolley Bases
and Brakes

Mail. Iron and Brass
Castings

GALVANIZING HOT DIP

We have the largest jobbing galvanizing plant and battens in the United States. We guarantee our galvanizing to stand eight one minute dips in the Standard Copper Sulphate Solution Test. Galvanized Products furnished.

JOSEPH P. CATTIE & BROTHERS
Caul and Letterly Sts., Philadelphia, Penna.



Type R-11
Double Register

International Registers

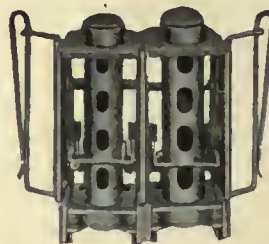
Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for
HEEREN ENAMEL BADGES.

The International Register Co.

15 South Throop Street, Chicago, Illinois

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY

Ravenswood, Chicago, Ill.



The Zone System of Fares
is Successfully Collected
with the Aid of

CLEVELAND FARE BOXES

Let Us Give You Particulars

The Cleveland Fare Box Co.
Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd.,
Preston, Ont.

Coin Counting and Sorting Machines. Change Carriers

Play for safety—

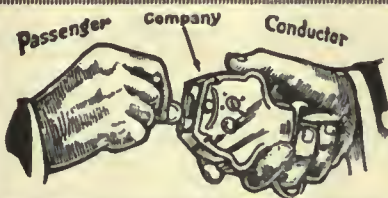
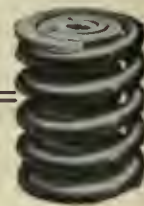
plus resiliency—

plus long life

By specifying

FORT PITT SPRINGS

FORT PITT SPRING &
MFG. CO.
Pittsburgh, Pa.



Direct
Automatic
Registration
By the
Passengers

Rooke Automatic
Register Co.
Providence, R. I.



Gets Every Fare
PEREY TURNSTILES
or PASSIMETERS

Use them in your Prepayment Areas and
Street Cars

Perey Manufacturing Co., Inc.
101 Park Avenue, New York City

RAILWAY UTILITY COMPANY

CAR COMFORT WITH
UTILITY

HEATERS
REGULATORS
VENTILATORS

141-151 West 22d St.
Chicago, Ill.

Write for
Catalogue

1328 Broadway
New York, N. Y.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No.

478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.



STUCKI
SIDE
BEARINGS

A. STUCKI CO
Oliver Bldg.
Pittsburgh, Pa.

PLYMETL

side panels cut weight
and operating expenses

Haskelite Manufacturing Corp., 133 W. Washington St., Chicago

THE SEARCHLIGHT SECTION

will locate the

Man you want

Position you want

Equipment you want

Are you using the Searchlight?

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its **ENDURANCE** and **ECONOMY**.

Sold by Nat Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

**COST MORE PER BRUSH
COST LESS PER CAR MILE**

W. J. Jeandron

345 Madison Avenue, New York

Pittsburgh Office: 634 Wabash Bldg.

Chicago Office: 1657 Monadnock Block

San Francisco Office: 525 Market Street

Canadian Distributors: Lyman Tube & Supply Co., Ltd.,
Montreal and Toronto



We make a specialty of
**ELECTRIC RAILWAY
LUBRICATION**

We solicit a test of TULC
on your equipment

The Universal Lubricating Co.
Cleveland, Ohio

Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.



Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

BRAKE SHOES

**AERA Standards
Brake Heads**



Diamond "S" Steel Back and Lug Shoes
best for all equipment.

Manufactured and sold under U. S.
Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago



Wet Passengers

make poor "boosters" for your service in rainy weather.

Breakdowns mean long delays and rain-drenched patrons...

AJAX BULL BEARING ALLOY

in the bearings keeps your lines running on schedule

The Ajax Metal Company

ESTABLISHED 1880
PHILADELPHIA

New York

Chicago

Boston

Cleveland

Clip time—clip costs with the FLOWER BRUSH HOLDER

Reversible—Replaceable Box

To start with this box is made of rolled plate which of course wears longer than the softer cast metal.

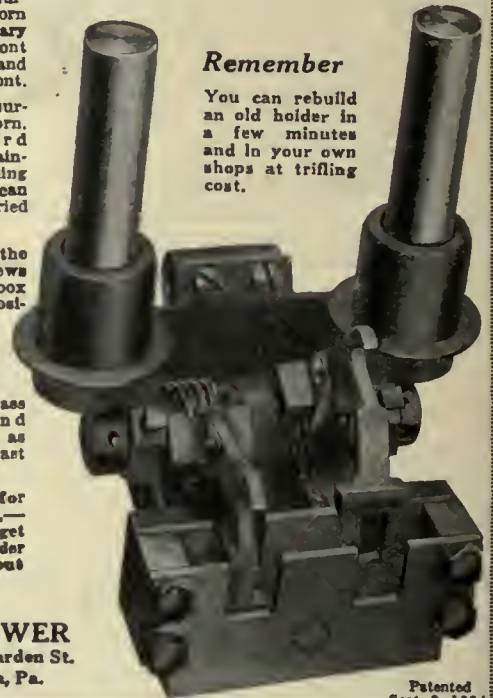
When inner surfaces have worn it is necessary only to put front plate in rear and rear plate in front.

When all four surfaces are worn, new standard parts are obtainable at trifling cost—a stock can easily be carried at all times.

What's more the four cap screws that bind the box together are positively secured against loosening by a special form of soft brass locking band washer. Just as secure as a cast box.

Write now for further details—or better still get a Flower Holder and try it out yourself.

D. B. FLOWER
1217 Spring Garden St.
Philadelphia, Pa.



Remember

You can rebuild an old holder in a few minutes and in your own shops at trifling cost.

Patented
Sept. 2, 1924

If there is anything you want—

or something you don't want that *other* readers of this paper can supply—or use—advertise in the

Searchlight Section

NOW— is the time to offer good second-hand equipment or machinery for sale. The demand is great for good plant for immediate delivery. That's why you should advertise NOW.

NOW— or any other time, use the Searchlight Section for advertising

Agencies Wanted
Agents Wanted
Auction Notices
Buildings For Sale
Business Opportunities
Civil Service Opportunities
Contracts To Be Let

Contracts Wanted
Educational Courses
Employment Agencies
Exchanges
For Rent Items
Franchises
Industrial Sites

Miscellaneous Wants
New Industries Wanted
Partners Wanted
Patents For Sale
Patent Attorneys
Plants For Sale
Positions Vacant

Positions Wanted
Property For Sale
Receivers' Sales
Representatives Wanted
Salesmen Wanted
Work Wanted
Etc., Etc., Etc.

35

GODWIN Steel Paving Guards

Adapted to all
types of rails
and paving



Proven by service to economically prevent seepage and disintegration of street railway paving.

Write for Illustrated Catalog No. 20.

W. S. GODWIN CO., Inc.
RACE & McCOMAS STS., BALTIMORE, MD.

PROVIDENCE H-B FENDERS LIFE GUARDS

The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

100 New Users in the Last Nine Months KASS SAFETY TREADS

HIGH
in efficiency and lasting qualities
LOW

in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago

SEARCHLIGHT SECTION

USED EQUIPMENT @ NEW BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD.

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 3 cents a word, minimum charge \$2.00.

Proposals, 10 cents a line an insertion.

INFORMATION

Box Numbers in care of any of our offices count 18 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH

1 to 3 inches \$1.50 an inch
4 to 7 inches 1.30 an inch
8 to 14 inches 1.10 an inch
Rates for larger spaces, or yearly rates, on request.
In advertising such is measured vertically on one column, 3 columns 20 inches—to a page.

E.F.J.

POSITIONS VACANT

ACTIVE, ambitious young man wanted for the position of street and interurban railway superintendent. Must have had technical training for electrical engineering and experience in operating responsibility. Must furnish references and complete statement of experience. An excellent executive opportunity with rapidly growing street and interurban railway system in the Middle West. P-772, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

EXECUTIVE, Urban and Interurban. Wide successful experience in all departments of construction and operation. PW-740, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

EXECUTIVE, twelve years' experience in engineering and operation, city and interurban; first-class record and references. PW-757, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

GENERAL shop foreman, city or interurban, 18 years' successful experience in maintenance operation and general shop management. At present employed. Personal reasons for change. PW-767, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

GENERAL superintendent, chief engineer, or superintendent of equipment, technical graduate, eighteen years' experience on construction, operation, maintenance of power, shops, track, line buses. Highly successful in handling men and materials and producing results, fine references. Personal reasons for desiring change. PW-768, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

MASTER mechanic, with broad experience and successful record backed by prominent executives in railway field, desires change. PW-769, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT of equipment thoroughly experienced and successful in the efficient maintenance of auto buses, city and interurban cars, desires to change. Confidential interview solicited. PW-771, Electric Railway Journal, 10th Ave. at 36th St., New York.

YOUNG man, college graduate, with practical electric railway purchasing experience. Also familiar with chief clerk's duties. PW-773, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

WANTED

150 Tons 6-In. High Tee

RAILS

State Condition, Weight and Section

W-770, Electric Railway Journal, 1570 Old Colony Bldg., Chicago, Ill.

WE WANT TO BUY

30—West. 306-C.V.-4

MOTORS

Have you any to offer?

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

Relaying Rails

NEW RAILS - ACCESSORIES

Buy Guaranteed
Relaying Rails
and Save 30%
to 50%

1 Ton or 1000

LBFOSTERCO

PITTSBURGH, PA. NEW YORK CITY
JERSEY CITY PHILADELPHIA HAMILTON, O.

20—WH 68 Armatures and 6 Motor Cases.
12—WH 101D Armatures and 6 Motor Cases.

4—GE 1000 Armatures and 4 Motor Cases.
FOR SALE

INDIANA COUNTY ST. RAILWAYS CO.
Indiana, Pennsylvania

Air Compressors

FOR SALE

18—General Electric C.P. 27.

11—Westinghouse D.H. 16.

Overhauled—Guaranteed.

Also 500 various other types.

Transit Equipment Co.

Cars and Motors

501 Fifth Ave., New York, N. Y.

1200 Tons 70 lb. ASCE

Relaying Rails

Strictly First Class
With Angle Bars

ZELNICKER IN ST. LOUIS

Cars—Locomotives—Hoists—Etc.

**Agents
Salesmen
Representatives
Selling Opportunities**

You can find them all
through an ad in the

SEARCHLIGHT SECTION

Your ad here will have
the attention of the
whole industry and
the cost is small.

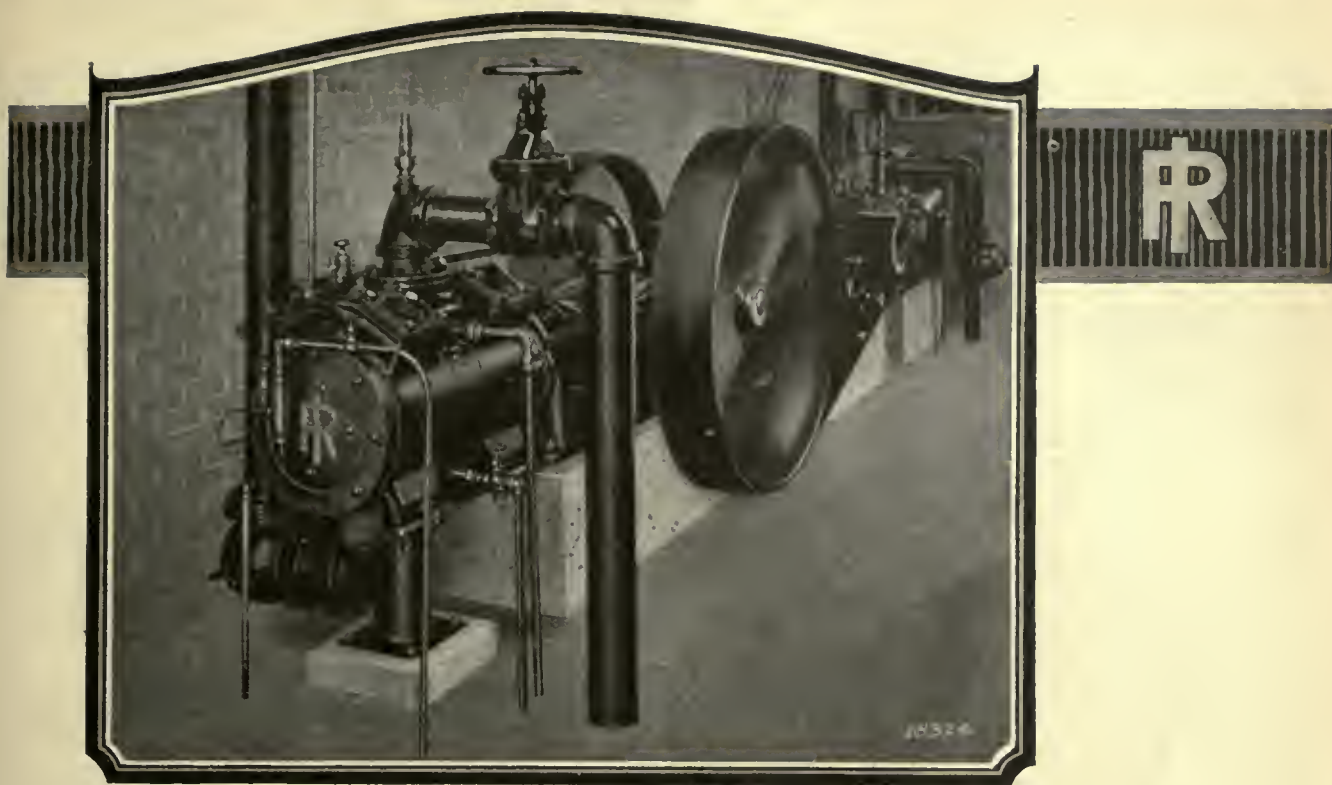
For Every Business Want

"Think SEARCHLIGHT First"

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

- Advertising, Street Car
Collier, Inc., Barron G.
- Air Receivers & Aftercoolers
Ingersoll-Rand Co.
- Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Armature Shop Tools
Elec. Service Supplies Co.
- Automatic Return Switch
Stands
Ramapo Ajax Corp.
- Automatic Safety Switch
Stands
Ramapo Ajax Corp.
- Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Johnson & Co., J. R.
St. Louis Car Co.
- Axles, Steel
Carnegie Steel Co.
Laclede Steel Co.
- Babbitt Metal
Ajax Metal Co.
- Badges and Buttons
Elec. Service Supplies Co.
Int. Register Co., The
- Barges, Steel
American Bridge Co.
- Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
General Electric Co.
More-Jones Brass & Metal Co.
- St. Louis Car Co.
Westinghouse E. & M. Co.
- Bearings, Center and Roller
Slide
Baldwin Locomotive Wks.
Stucki Co., A.
- Bells and Gongs
Brill Co., The J. G.
Elec. Service Supplies Co.
St. Louis Car Co.
- Boilers
Babcock & Wilcox Co.
Holler Tubes
National Tube Co.
- Bond Testers
Amor, Steel & Wire Co.
Elec. Service Supplies Co.
- Bonding Apparatus
Amor, Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
- Bonds, Rail
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.
- Book Publishers
McGraw-Hill Co., Inc.
- Brackets and Cross Arms
(See also Poles, Ties,
Posts, etc.)
American Bridge Co.
Bates Expanded Steel Truss
Co.
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
- Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
- Brake Shoes
Amor, Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
- Brakes, Brake Systems and
Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
Johns-Manville, Inc.
National Brake Co.
St. Louis Car Co.
- Safety Car Devices Co.
Bridges, Steel
American Bridge Co.
- Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.
- Brush Holders
D. B. Flower
- Brushes, Wire, Pneumatic
Ingersoll-Rand Co.
- Buildings, Steel
American Bridge Co.
- Railheads
Haskelite Mfg. Co.
- Buses, Motor
Brill Co., The J. G.
Garford Motor Truck Co.
International Motor Co.
- N. Y. Transportation Co.
St. Louis Car Co.
- Bue Seats
Hale-Kilburn Co.
Heywood-Wakefield Co.
- Bushings, Case Hardened and
Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Long Co., E. G.
St. Louis Car Co.
- Cables (See Wires and
Cables)
- Cambrio Tapes, Yellow and
Black Varished
Irvington Varnish & Ins. Co.
Mica Insulator Co.
- Carbon Brushes (See Brushes,
Carbon)
- Car Panel Safety Switches
Westinghouse E. & M. Co.
- Cars, Dump
Differential Steel Car Co.
St. Louis Car Co.
- Car Lighting Fixtures
Elec. Service Supplies Co.
- Car Panel Safety Switches
Consolidated Car Heat'g Co.
Westinghouse E. & M. Co.
- Cars, Passenger, Freight, Ex-
press, etc.
Amor, Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
- Cars, Gas Rail
St. Louis Car Co.
- Cars, Self-Propelled
General Electric Co.
- Car Wheels, Rolled Steel
Bethlehem Steel Co.
- Castings, Brass, Composition
or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. &
J. M.
More-Jones Brass & Metal
Co.
- Castings, Gray Iron and Steel
Bemis Car Truck Co.
St. Louis Car Co.
- Castings, Malleable and Brass
Amor, Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Horne & Ebling Corp.
St. Louis Car Co.
- Catchers and Retrievers,
Trolley
Earl, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
- Cateory Construction
Archbold-Brady Co.
- Change Carriers
Cleveland Fare Box Co.
- Circuit-Breakers
Anderson, A. & J. M.,
Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Clamps and Connectors for
Wires and Cables
Dossert & Co.
- Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
- Cleaners and Scrapers, Track
(See also Snow-Plows,
Sweepers and Brooms)
Brill Co., The J. G.
St. Louis Car Co.
- Clusters and Sockets
General Electric Co.
- Coal and Ash Handling (See
Conveying and Hoisting
Machinery)
- Coil Banding and Winding
Machines
Elec. Service Supplies Co.
- Colls, Armature and Field
Economy Electric Devices
Co.
General Electric Co.
Westinghouse E. & M. Co.
- Colls, Choke and Kleking
Elec. Service Supplies Co.
- General Electric Co.
Westinghouse E. & M. Co.
- Colo. Counting Machines
Cleveland Fare Box Co.
- Intern'l Register Co.
Johnson Fare Box Co.
- Coin Sorting Machines
Cleveland Fare Box Co.
- Coin Wrappers
Cleveland Fare Box Co.
- Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Commutator Truing Devices
General Electric Co.
- Commutators or Parts
Cameron Elec'l Mfg. Co.
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.
- Compounds (Insulating and
Splicing)
Johns-Manville, Inc.
- Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Sullivan Machinery Co.
Westinghouse Tr. Br. Co.
- Compressors, Air Portable
Ingersoll-Rand Co.
Sullivan Machinery Co.
- Compressors, Gas
Sullivan Machinery Co.
- Concrete Reinforcing Bars
Laclede Steel Co.
- Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
- Condenser Papers
Irvington Varnish & Ins. Co.
- Connectors, Solderless
Dossert & Co.
Westinghouse E. & M. Co.
- Connectors, Trailer Car
Elec. Service Supplies Co.
Ohio Brass Co.
- Controllers or Parts
General Electric Co.
Westinghouse E. & M. Co.
- Controller Regulators
Elec. Service Supplies Co.
- Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.
- Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Conveying and Hoisting Ma-
chinery
American Bridge Co.
Columbia M. W. & M. I. Co.
- Copper Wire
Anaconda Copper Mining Co.
- Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Roebling's Sons Co., J. A.
St. Louis Car Co.
Samson Cordage Works
Silver Lake Co.
- Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
- Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
- Cross Arms (See Brackets)
- Crossing Foundations
International Steel Tie Co.
- Crossings
Ramapo Ajax Corp.
- Crossing Signals (See Sig-
nals, Crossing)
- Crossing, Frog & Switch
Ramapo Ajax Corp.
- Crossing Manganese
Bethlehem Steel Co.
- Ramapo Ajax Corp.
- Crossings, Track (See Track,
Special Work)
- Crossings, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
- Curtains and Curtain Fixtures
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.
- Dealer's Machinery
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equip. Co.
- Derailing Devices (See also
Track Work)
- Wharton, Jr., & Co., Wm.
Derailing Switches, Tee Rail
Ramapo Ajax Corp.
- Detective Service
Wish-Servise, P. Edward
- Doors & Door Fixtures
Hale-Kilburn Co.
St. Louis Car Co.
- Door Operating Devices
Brill Co., The J. G.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
- Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
- Drills, Rock
Sullivan Machinery Co.
- Drills, Track
Amor, Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
- Dryers, Sand
Elec. Service Supplies Co.
- Ears
Anderson Mfg. Co., A. &
J. M.
Ohio Brass Co.
- Ebony, Asbestos, Wood
Johns-Manville, Inc.
- Economizers
Power Specialty Co.
Electric Transmission Towers
American Bridge Co.
- Electrical Wires and Cables
Amor, Electrical Works
Roebling's Sons & Co., J. A.
- Electric Grinders
Railway Track-work Co.
- Electrodes, Carbon
Railway Track-work Co.
- Electrodes, Steel
Railway Track-work Co.
- Engineers, Consulting, Con-
tracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layng Corp.
Bureau of Comm. Econom-
ics, Inc.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly, Cooke & Co.
Ong, Joe R.
Railway Audit & Inspection
Co.
Richey, Albert S.
Robinson & Co., D. P.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.
- Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
- Exterior Side Panels
Haskelite Mfg. Co.
- Fare Boxes
Cleveland Fare Box Co.
Economy Electric Devices
Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.
- Fences, Woven Wire and
Fence Posts
Amor, Steel & Wire Co.
Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.
Star Brass Works
- Fibre and Fibre Tinting
Johns-Manville, Inc.
- Westinghouse E. & M. Co.
- Field Colls (See Colls)
- Fire Extinguishers
Johns-Manville, Inc.
- Flangeway Guards, Steel
W. S. Godwin Co., Inc.
- Flaxlinum Insulation
Nat'l Ry. Appliance Co.
- Floodlights
Elec. Service Supplies Co.
- Flooring, Composition
Johns-Manville, Inc.
- Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
- Ramapo Ajax Corp.
- Frogs, Track (See Track
Work)
- Frogs, Trolley
Anderson Mfg. Co., A. &
J. M.
Ohio Brass Co.
- Furnaces, Electric Steel
Weldlog
American Bridge Co.
- Fuses and Fuse Boxes
General Electric Co.
Westinghouse E. & M. Co.
- Fuses, Refillable
General Electric Co.
- Galvanizers, Hot Dip
Jos. P. Cattie & Bros.
- Gaskets
Johns-Manville, Inc.
Westinghouse Tr. Br. Co.
- Gas-Electric Cars
General Electric Co.
- Gasoline Torches
Economy Electric Devices
Co.
- Gas Producers
Westinghouse E. & M. Co.
- Gates, Car
Brill Co., The J. G.
St. Louis Car Co.
- Gear Blanks
Bethlehem Steel Co.
- Gear Cases
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
- Gears and Pinions
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion
Co.
- Generating Sets, Gas-Electric
General Electric Co.
- Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Girdler Rails
Bethlehem Steel Co.
Lorain Steel Co.
- Gong (See Bells and Gongs)
- Greases (See Lubricants)
- Grinders and Grind, Supplies
Railway Track-work Co.
- Grinders, Portable
Buda Company
Railway Track-work Co.
- Grinders, Portable Electric
Railway Track-work Co.
- Grinding Blocks and Wheels
Railway Track-work Co.
- Guard Rail Clamps
Ramapo Ajax Corp.
- Guard Rails, Tee Rail &
Manganese
Ramapo Ajax Corp.
- Guards, Trolley
Elec. Service Sup. Co.
Ohio Brass Co.
- Hammers, Pneumatic
Ingersoll-Rand Co.
- Haps, Trolley
Elec. Service Supplies Co.
More-Jones Brass & Metal
Co.
- Nuttall Co., R. D. & Co.
Star Brass Works
- Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
- Headlining
Haskelite Mfg. Co.
Panolyte Co.
- Heaters, Car (Electric)
Economy Electric Devices
Co.
Gold Car Heat. & Light Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter
Heaters, Car, Hot Air and
Water
Elec. Service Sup. Co.
Smith Heater Co., Peter
Heaters for Special Purposes
Power Specialty Co.
- Helmet—Felding
Railway Track-work Co.
- Holst & Lifts
Ford Chain Block Co.
- Holts, Portable
Ingersoll-Rand Co.
Sullivan Machinery Co.
- Hydraulic Machinery
Allis-Chalmers Mfg. Co.
- Industrial Flooring
Johns-Manville, Inc.
- Instruments, Measuring,
Testing and Recording
Economy Electric Devices
Co.
- Elc. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Insulating Cloth, Paper and
Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Johns-Manville, Inc.
Mica Insulator Co.
Okonite Co.
Stand. Underground Cable
Co.
- Westinghouse E. & M. Co.
- Insulating Silk
Irvington Varnish & Ins. Co.
- Insulating Varnishes
Irvington Varnish & Ins. Co.
- Insulation (See also Paints)
Electric Ry. Equipment Co.
Electric Service Sun. Co.



A Reliable Compressor for Continuous Duty

A shop dependent upon the continuous operation of an air compressor can not afford a machine of unproven reliability.

Ingersoll-Rand Class "E-R" Compressors can be installed with the positive assurance of working steadily and delivering air power at the lowest cost. They have proven reliable beyond question.

Class "ER" design is the result of fifty-three years' experience in building air compressors. The materials and workmanship entering into "ER" construction are the best obtainable.

A thorough running test is given every "ER" Compressor before shipment.

Bulletin No. 3050 points out in detail the reasons for the superiority of Class "ER" Compressors. Send for your copy now.

INGERSOLL-RAND COMPANY, 11 BROADWAY, NEW YORK CITY

Offices in principal cities the world over

For Canada: Refer, Canadian Ingersoll-Rand Co., Limited, 260 St. James St., Montreal, Quebec.

Ingersoll-Rand

R-100

- General Electric Co.
Irvington Varnish & Ins. Co.
Johns-Manville, Inc.
Mica Insulator Co.
Okonite Co.
Westinghouse E. & M. Co.
- Insulation Slot
Irvington Varnish & Ins. Co.
- Insulators (See also Line Material)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.
- Jacks (See also Cranes, Hoists and Lifts)
Buda Company
Elec. Service Supplies Co.
- Joints, Rail (See Rail Joints)
- Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
St. Louis Car Co.
- Junction Boxes
Horne & Ebling Corp.
Std. Underground Cable Co.
- Lamps, Guards and Fixtures
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Signal and Marker
Nichols-Lintern Co.
- Lanterns, Classification
Nichols-Lintern Co.
- Lightning Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.
- Line Material (See also Brackets, Insulators, Wires, etc.)
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Dossert & Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
Hubbard & Co.
Johns-Manville, Inc.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Locomotives, Electric
Baldwin Locomotive Wks.
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
- Locomotives, Oil Engine, Electric Driven
Ingersoll-Rand Co.
- Lubricating Engineers
Galena Signal Oil Co.
Standard Oil Co. of Ind.
Texas Company
- Universal Lubricating Co.
- Lubricants, Oil and Grease
Galena-Signal Oil Co.
Standard Oil Co. of Ind.
Texas Company
- Universal Lubricating Co.
- Machinery, Insulating
Amer. Insulating Mach. Co.
- Manganese Steel Guard Rails
Ramapo Ajax Corp.
Manganese Steel Switches, Frogs & Crossings
Bethlehem Steel Co.
Ramapo Ajax Corp.
Manganese Steel, Special Track Work
Bethlehem Steel Co.
- Meters (See Instruments)
- Mica
Mica Insulator Co.
- Molding, Metal
Allis-Chalmers Mfg. Co.
- Motor Buses (See Buses, Motor)
- Motor Leads
Dossert & Co.
- Motors, Electric
Westinghouse E. & M. Co.
- Motors and Generator Sets
General Electric Co.
- Motormen's Seats
Allis-Chalmers Mfg. Co.
Brill Co., J. G.
Elec. Service Sup. Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.
- Nuts and Bolts
Bethlehem Steel Co.
Bemis Car Truck Co.
Hubbard & Co.
- Oil Heaters
Power Specialty Co.
Oils (See Lubricants)
- Oil-buses (See Buses, Motor)
- Oxy-Acetylene (See Cutting Apparatus Oxy-Acetylene)
- Packing
Johns-Manville, Inc.
- Paints and Varnishes (Insulating)
Mica Insulator Co.
National Ry. Appliance Co.
- Pavement Breakers
Ingersoll-Rand Co.
Sullivan Machinery Co.
- Paving Brick Vitrified
Nat'l Paving Brick Mfrs. Ass'n.
- Paving Guards, Steel
W. S. Godwin Co., Inc.
- Paving Material
Amer. Br. Shoe & Fdy. Co.
- Pickups, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.
- Pinion Pullers
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.
- Pinkons (See Gears)
- Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.
- Pins, Wood & Iron
Sharp, Ew. P.
- Pipe
National Tube Co.
- Pipe Fittings
Westinghouse Tr. Brake Co.
- Planers (See Machine Tools)
- Plates for Tee Rail Switches
Ramapo Ajax Corp.
- Pliers, Rubber Insulated
Elec. Service Sup. Co.
- Pneumatic Tools
Ingersoll-Rand Co.
- Pole Line Hardware
Bethlehem Steel Co.
Ohio Brass Co.
- Poles, Metal Street
Bates Expanded Steel Truss Co.
Elec. Ry. Equipment Co.
Hubbard & Co.
- Pole Reinforcing
Hubbard & Co.
- Poles & Ties Treated
Bell Lumber Co.
International Creosoting & Construction Co.
- Poles, Ties, Posts, Piling & Lumber
Bell Lumber Co.
International Creosoting & Construction Co.
- Poles, Trolley
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
National Tube Co.
Nuttall Co., R. D.
- Poles, Tubular
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
National Tube Co.
- Portable Grinders
Buda Company
- Potholes
Okonite Co.
- Power Houses
American Bridge Co.
- Power Saving Devices
Economy Electric Devices Co.
- National Ry. Appliance Co.
- Pressure Regulators
General Electric Co.
Westinghouse E. & M. Co.
- Pumps
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
- Pumps, Air Lift
Sullivan Machinery Co.
- Pumps, Vacuum
Ingersoll-Rand Co.
- Sullivan Machinery Co.
- Punches, Ticket
Intern'l Register Co. The
Wood Co., Chas. N.
- Rail Braces & Fastenings
Ramapo Ajax Corp.
- Rail Grinders (See Grinders)
- Rail Joints
Carnegie Steel Co.
Rail Joint Co.
- Rail Joints—Welded
Lorain Steel Co.
- Rails Relaying
L. B. Foster Co.
Hyman-Michaels Co.
Ralls, Steel
Bethlehem Steel Co.
L. B. Foster Co.
Carnegie Steel Co.
- Railway Paving Guards, Steel
Godwin Co., Inc., W. S.
- Railway Safety Switches
Westinghouse E. & M. Co.
- Rail Joints
Rail Joint Co.
- Rail Welding
Railway Track-work Co.
- Rattan
Brill Co., The J. G.
Elec. Service Supplies Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
- Registers and Fittings
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Rooke Automatic Register Co.
St. Louis Car Co.
- Reinforcement, Concrete
Amer. Steel & Wire Co.
- Repair Shop Appliances (See also Coil Banding and Winding Machines)
Elec. Service Supplies Co.
- Repair Work (See also Colls)
General Electric Co.
Westinghouse E. & M. Co.
- Replacers, Car
Elec. Service Sup. Co.
- Resistance, Wire and Tube
General Electric Co.
Westinghouse E. & M. Co.
- Retrievers, Trolley (See Catchers and Retrievers, Trolley)
- Rheostats
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.
- Roofing Asbestos (Car)
Johns-Manville, Inc.
- Roofs
Haskelite Mfg. Co.
- Sanders, Track
Brill Co., The J. G.
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.
- Sash Fixtures, Car
Brill Co., The J. G.
Horne & Ebling Corp.
St. Louis Car Co.
- Sash, Metal, Car Window
Hale-Kilburn Co.
- Scrapers, Track (See Cleaners and Scrapers, Track)
- Screw Drivers, Rubber Insulated
Elec. Service Sup. Co.
- Seats, Bus
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.
- Seats, Car (See also Kettan)
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.
- Sealing Materials
Brill Co., J. G.
Heywood-Wakefield Co.
St. Louis Car Co.
- Second Hand Equipment
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equip. Co.
- Shades, Vestibule
Brill Co., The J. G.
- Shovels
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.
Hubbard & Co.
- Side Bearings (See Bearings, Center and Side)
- Signals, Car Starting
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.
- Signals, Indicating
Nichols-Lintern Co.
- Signal Systems, Block
Elec. Service Sup. Co.
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
Wood Co., Chas. N.
- Signal Systems, Highway Crossing
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
- Slack Adjusters (See Brake Adjusters)
- Steel Wheels and Cutters
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
- Nuttall Co., R. D.
- Smokestacks, Car
Nichols-Lintern Co.
- Snow Sweepers, Kettan
Heywood-Wakefield Co.
- Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Consolidated Car Fender Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
- Sockets & Receptacles
Johns-Manville, Inc.
- Soldering and Brazing Apparatus (See Welding Processes and Apparatus)
- Special Adhesive Papers
Irvington Varnish & Ins. Co.
- Special Trackwork
Bethlehem Steel Co.
Buda Company
Lorain Steel Co.
- Spikes
Amer. Steel & Wire Co.
- Splicing Compounds
Westinghouse E. & M. Co.
- Splicing Sleeves (See Clamps and Connectors)
- Springs, Car and Truck
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
St. Louis Car Co.
- Sprinklers, Track and Road
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
- Steel and Steel Products
Morton Mfg. Co.
- Steps, Car
Morton Mfg. Co.
- Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.
- Storage Batteries (See Batteries, Storage)
- Sirals, Insulators
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
- Strand
Roebbling's Sons Co., J. A.
- Superheaters
Babcock & Wilcox Co.
Power Specialty Co.
- Sweepers, Snow (See Snow Plows, Sweepers and Brooms)
- Switchboxes
Johns-Manville, Inc.
- Switch Stands & Fixtures
Ramapo Ajax Corp.
- Switches, Selector
Nichols-Lintern Co.
- Switches, Tee Rail
Ramapo Ajax Corp.
- Switches, Track (See Track Special Work)
- Switches and Switchboards
Allis-Chalmers Mfg. Co.
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Tampers, Tie
Ingersoll-Rand Co.
- Railway Track-work Co.
- Tapes and Cloths (See Insulating Cloth, Paper and Tape)
- Tee Rail Special Track Work
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Telephones and Parts
Elec. Service Supplies Co.
- Terminals, Cable
Std. Underground Cable Co.
- Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)
- Thermostats
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter
- Ticket Choppers & Destroyers
Elec. Service Supplies Co.
- Ties, All Metal
Metal Safety R.R. Tie Co.
- Ties and Tie Rods, Steel
Carnegie Steel Co.
Godwin Co., Inc., W. S.
- International Steel Tie Co.
- Ties, Wood Cross (See Poles, Ties, Posts, etc.)
- Tires
General Tire & Rubber Co.
- Tool Steel
Bethlehem Steel Co.
- Tools, Track & Miscellaneous
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Hubbard & Co.
- Railway Track-work Co.
- Torches, Acetylene (See Cutting Apparatus)
- Towers and Transmission Structures
Archbold-Brady Co.
- Bates Expanded Steel Truss Co.
- Westinghouse E. & M. Co.
- Track Grinders
Railway Track-work Co.
- Rail Welding & Bonding Co.
- Trackless Trolley Cars
St. Louis Car Co.
- Track, Special Work
Bethlehem Steel Co.
Buda Company
N. Y. Switch & Crossing Co.
- Ramapo Ajax Corp.
Wharton, Jr., & Co., Inc., W.
- Transfer (See Tickets)
- Transformers
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Treads, Safety, Stair, Car
Step
Morton Mfg. Co.
- Trolley Bases
Anderson Mfg. Co., A. J. & J. M.
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
- Nuttall Co., R. D.
- Ohio Brass Co.
- Trolley Bases, Retrieving
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.
- Trolley Buses
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.
- Trolley Material (Overhead)
Bates Expanded Steel Truss
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
- Ohio Brass Co.
- Trolley Shoe
Miller Trolley Shoe Co.
- Trolleys & Trolley System
Ford Chalmers Block Co.
- Trolley Wheels (See Wheels, Trolley)
- Trolley Wheel Bushings
More-Jones Brass & Metal Co.
- Trolley Wheels & Harps
More-Jones Brass & Metal Co.
- Trolley Wire
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebbling's Sons Co., J. A.
- Trucks, Car
Baldwin Locomotive Wks.
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
- Tubing, Steel
National Tube Co.
- Tubing, Yellow & Black, Flexible Varnish
Irvington Varnish & Ins. Co.
- Turbines, Steam
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Turnstiles
Elec. Service Supplies Co.
Percy Mfg. Co., Inc.
- Turntables
American Bridge Co.
- Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Varnished Papers
Irvington Varnish & Ins. Co.
- Varnished Silks
Irvington Varnish & Ins. Co.
- Varnishes
Beckwith-Chandler Co.
- Ventilators, Car
Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.
- Vestibule Linings
Haskelite Mfg. Co.
- Vitrified Paving Brick
Nat'l Paving Brick Mfrs. Ass'n.
- Welded Rail Joints
Alumino-Thermic Corp.
Ohio Brass Co.
- Railway Track-work Co.
- Welders, Portable Electric
Ohio Brass Co.
- Railway Track-work Co.
- Welding Processes and Apparatus
Alumino-Thermic Corp.
General Electric Co.
International Oxygen Co.
Ohio Brass Co.
- Railway Track-work Co.
Westinghouse E. & M. Co.
- Welding Steel
Railway Track-work Co.
- Wheel Guards (See Fenders and Wheel Guards)
- Wheel Presses (See Machine Tools)
- Wheels, Car Steel & Steel Tire
Carnegie Steel Co.
- Wheels, Trolley
Elec. Ry. Equipment Co.
Gilbert & Sons, B. F. A.
Sharp, Edw. P.
- Wheels, Trolley, Wrought Steel
Elec. Service Supplies Co.
General Electric Co.
Nuttall Co., R. D.
- Whistles, Air
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Wire Rope
Amer. Steel & Wire Co.
Roebbling's Sons Co., J. A.
- Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Roebbling's Sons Co., J. A.
- Std. Underground Cable Co.
Westinghouse E. & M. Co.



Complete satisfaction

Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

No-wear Check Pawl
Free-Winding Tension Spring
Ratchet Wind
Emergency Release
Perfect Automatic Lubrication

Earll Catchers and Retrievers

C. I. EARLL, York, Pa.



"Differential Two-Car Train. Trailer dumping load clear of trench."

DIFFERENTIAL CARS

Standard on Fifty Railways for

Track Maintenance	Track Construction
Ash Disposal	Hauling Crossties
Placing Ballast	Disposal of Waste
Coal Hauling	Snow Disposal
Concrete Materials to the Job	
Excavated Material to the Dump	

For Economy

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION
CAR-WHEEL TRUCK and TRACTOR

THE DIFFERENTIAL STEEL CAR CO.

Findlay, Ohio, U. S. A.

McGUIRE-CUMMINGS

Manufacturing Company

General Offices

111 W. Monroe St., Chicago, Ill.

Street Cars, Trucks
Snow Sweepers



Multiple Unit Control, double truck car for two-man operation.

Advertisements for the Searchlight Section

Can be received at the New York Office of Electric Railway Journal until 10 a. m.

Wednesday

For issue out Saturday



The "Ideal" Trolley Wheel
For Electric Railway and Crane Service

Our new type, low carbon steel flanges are softer than the overhead, thereby conserving it.

Perfect balance allows the Ideal to follow the wire more closely and with less spring tension.

The contact ring and hub is made of pure new copper with a small amount of tin, giving a low electrical resistance.

EDWARD P. SHARP
L. E. HARMON, Prop.
308-14 Terrace
Buffalo, N. Y.

Sales Representatives:
R. D. NUTTALL CO.
Pittsburgh, Pa.
NATIONAL BRAKE CO., Inc.
Buffalo, N. Y.

ALPHABETICAL INDEX TO ADVERTISEMENTS

Page	Page	Page	Page
A	E	K	
Ajax Metal Co..... 48	Earll, C. I..... 53	Kelly-Cooke Co..... 20	Railway Utility Co..... 46
Allia-Chalmers Mfg. Co..... 44	Economy Electric Devices Co. 15b	Kuhlman Car Co..... 55	Ramapo-Ajax Co. 45
Allison & Co., J. E..... 20	Electric Equipment Co..... 49		Richey, Albert S..... 20
Alumino-Thermic Corp. 42	Electric Railway Equipment Co. 15		Robinson Co., Dwight P..... 20
Amer. Brake Shoe & Fdy. Co.. 47	Electric Service Supplies Co... 7		Roebing's Sons Co., John A... 42
American Bridge Co..... 21		L	Rocke Automatic Register Co.. 46
American Car Co..... 55		Le Carbone Co..... 47	
American Electrical Works... 42	F	Long Co., E. G..... 44	S
American Insulating Mach. Co.. 42	Flower, D. B..... 48	Lorain Steel Co..... 43	St. Louis Car Co..... 23
American Steel & Wire Co..... 42	Ford, Bacon & Davis..... 20		Safety Car Devices Co..... 10
Anaconda Copper Mining Co... 42	Ford Chain Block Co..... 45	M	Samson Cordage Works..... 47
Anderson Mfg. Co., A. & J. M.. 38	"For Sale" Ads..... 49	McGraw-Hill Book Co..... 37	Sanderson & Porter 20
Archhold-Brady Co..... 21	Fort Pitt Spring & Mfg. Co.... 46	McGuire-Cummings Mfg. Co... 53	Searchlight Section 49
	Foster Co., L. B..... 45	Mica Insulator Co..... 44	Sharp, Edw. P..... 53
B	G	Miller Trolley Shoe Co..... 25	Shaw, Henry M..... 42
Babcock & Wilcox Co..... 43	Galena-Signal Oil Co..... 17	More-Jones Brass & Metal Co.. 36	Silver Lake Co..... 47
Baldwin Locomotive Works... 39	Garford Motor Truck Co..... 10	Morton Mfg. Co..... 48	Smith Heater Co., Peter..... 47
Bates Expanded Steel Truss Co. 8	General Electric Co., 18, Black Cover		Standard Oil Co..... 31
Beckwith-Chandler Co..... 33	General Tire & Rubber Co..... 22	N	Standard Underground Cable Co. 42
Beeler, John A..... 20	Godwin Co., Inc., W. S..... 48	Nachod Signal Co., Inc..... 40	Star Brass Works..... 47
Bell Lumber Co..... 54	Gold Car Heating & Ltg. Co... 46	National Brake Co..... 19	Stevens & Wood, Inc..... 20
Bemis Car Truck Co..... 32		National Paving Brick Mfrs.	Stone & Webster 20
Bethlehem Steel Co..... 43	H	Assn. 24	Stucki Co., A..... 46
Bibbina, J. Rowland 20	Hale-Kilburn Co..... 41	National Pneumatic Co., Inc... 9	Sullivan Machinery Co..... 41
Brill Co., The J. G..... 55	Haskelite Mfg. Co..... 46	National Railway Appliance Co. 45	
Buchanan & Iayng Corporation.. 21	"Help Wanted" Ads..... 49	National Tube Co..... 28	T
Buda Co..... 44	Hemphill & Wells 20	Nichols-Lintern Co..... 45	Texas Co. 34
Bureau of Com. Economics, Inc. 21	Heywood-Wakefield Co. 38	N. Y. Switch & Crossing Co... 43	Tool Steel Gear & Pinion Co.,
	Holst, Engelhardt W..... 20	N. Y. Transportation Co... 11	The 41
	Horne & Ebling, Inc..... 45	Nuttall Co., R. D..... 38	Transit Equip. Co..... 49
C	Hubbard & Co..... 42		
Cameron Electrical Mfg. Co.... 44	Hyman-Michaels Co..... 49	O	
Carnegie Steel Co..... 44		Ohio Brass Co..... 5	U
Cattie & Bros., Jos. P..... 45	I	Okonite Co., The..... 44	Universal Lubricating Co..... 47
Chillingworth Mfg. Co..... 40	Ingersoll-Rand Co. 51	Org. Joe R..... 21	U. S. Electric Signal Co..... 42
Cleveland Fare Box Co..... 46	International Creaming & Con-		
Collier, Inc., Barron G..... 30	struction Co..... 15a	P	
Consolidated Car Fender Co.... 48	International Motor Co., 12-13	Panelyte Co. 46	
Consolidated Car Heating Co... 35	International Regulator Co., The. 40	Perey Mfg. Co., Inc..... 46	
	International Steel Tie Co.,	Positions Wanted and Vacant.. 40	W
	Front Cover	Power Specialty Co..... 44	"Want" Ads 49
D	Irvington Varnish & Insulator Co. 45		Wason Mfg. Co..... 55
Dayton Mech. Tie Co..... 26-27	J	R	Westinghouse Electric & Mfg.
Day & Zimmermann, Inc..... 20	Jackson, Walter 20	Rail Joint Co..... 43	Co. 24
Differential Steel Car Co., The.. 53	Jeandron, W. J..... 47	Railway Audit & Inspection Co. 20	Westinghouse Traction Brake Co. 14
Dosaert Co. 43	Johnson & Co., J. R..... 54	Railway Track-work Co..... 6	White Engineering Corp., J. G. 20
Drum & Co., A. L..... 21	Johnson Fare Box Co..... 46		Wish Service, The P. Edw.... 21
	Johns-Manville Co., Inc..... 37		Wood Co., Chas. N..... 42

Northern **CEDAR POLES** Western

We guarantee
all grades of poles; also any butt-treating specifications

BELL LUMBER COMPANY

Minneapolis, Minn.

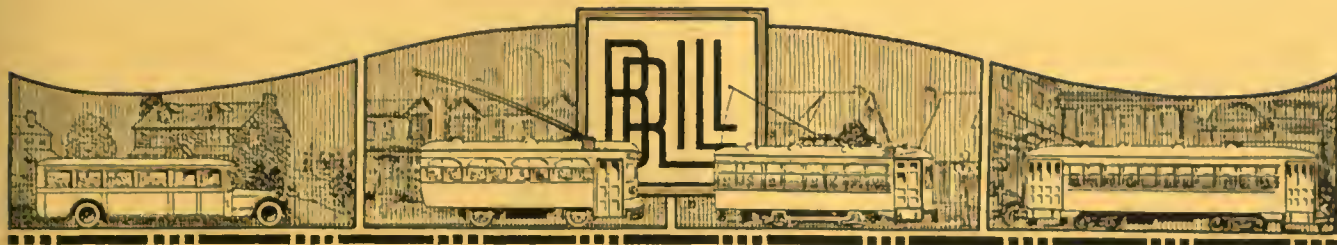
"Axle Specialists Since 1866"
Address all Mail to Post Office Box 515, Richmond, Va.

CAR AXLES

J. R. JOHNSON AND CO., INC.

FORGED STEEL AXLES

For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or
Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large
Shafts, Round Bars, etc.



Phila. & West Chester Trac. Co's. New High-Speed Cars

Ten Center-entrance Center-exit cars, of the railway company's standard design, were recently delivered to the Philadelphia & West Chester Traction Co. These new cars, mounted on Brill High-speed Trucks, 27-MCB-2X, are noted for their smooth and comfortable riding action, to which their general popu-

larity with the public may be largely attributed.

Seating accommodations are provided for 62 passengers; the cars measure 48 feet long overall, 8 ft. 7 in. wide over posts, and equipped with quadruple 50 H.P. motors weigh 59,000 lb.

Catalog No. 277 contains a complete line of modern transportation equipment.

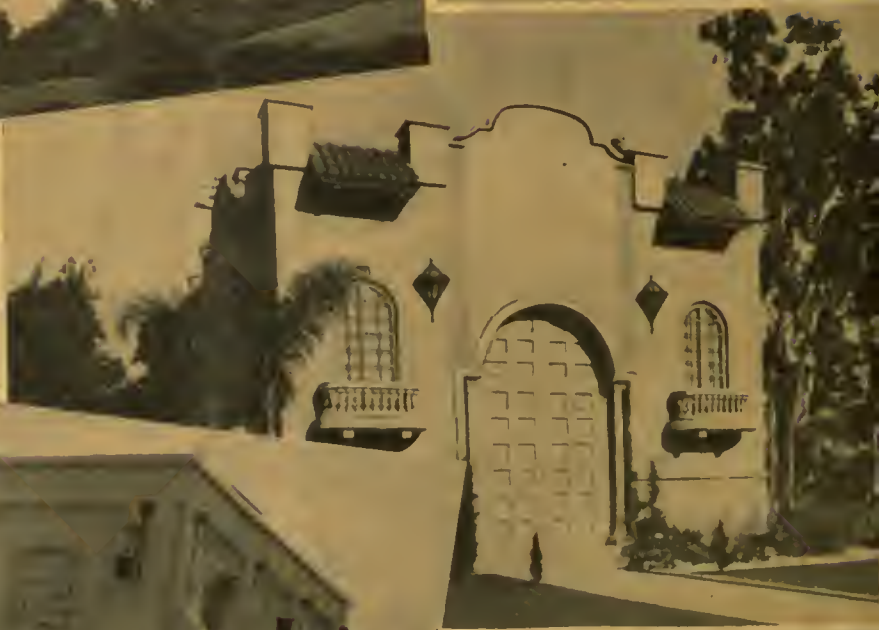
THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO.
ST. LOUIS, MO.

G. C. KUHLMAN CAR CO.
CLEVELAND, OHIO.

WASON MANF'G CO.
SPRINGFIELD, MASS.





**Noiseless Substations
—G-E Equipped**

West Adams, 1000 kw. (upper left)
Melrose, 2000 kw. (above)
Gorvanza, 1000 kw. (left)
West 54th St., 1000 kw. (not shown)
Central Ave., 3000 kw. (being built)



G-E AUTOMATIC SUBSTATIONS have enabled the Los Angeles Railway to locate power delivery points in restricted residential districts. They are solving this distribution problem because they could be totally enclosed and made sound-proof—one advantage of automatic control.

GENERAL ELECTRIC

ELECTRIC RAILWAY JOURNAL



HOUSTON PUBLIC LIBRARY
JAN 27 1925
HOUSTON, TEXAS
Thirteenth St., Augusta, Ga.
An Installation of the Carey System of
Track Insulation by Augusta-Aiken Ry.
and El. Corp.
W. H. Wise, City Engineer.
D. B. Bell, Eng.
M-W Augusta-Aiken Ry. & El. Corp.



Better Tracks and Streets for Augusta, Ga.

Augusta's street railway company, car-riding public, motorists and taxpayers are all to profit by the use of the Carey System of Track Insulation.

In the re-paving of Thirteenth St., between Green and Ellis, Carey Elastite Rail Filler is used in the rail and Carey Elastite Rail Cushion between ties, absorbing the objectionable noise of rail vibration, the destructive traffic-impact, and making the track water-tight.

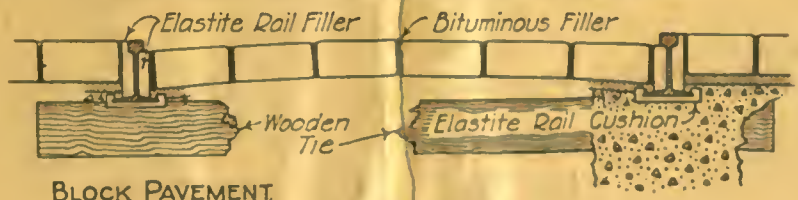
This cushioning of the rails means quiet, smooth travel for car-passengers, reduced expenditure for pavement repairs and less wear and tear on street cars and automobiles.

Send for complete information and samples.

THE PHILIP CAREY COMPANY
53 Wayne Ave., Lackland, Cincinnati, Ohio

Carey Elastite

SYSTEM OF TRACK INSULATION



Elastite Rail Filler

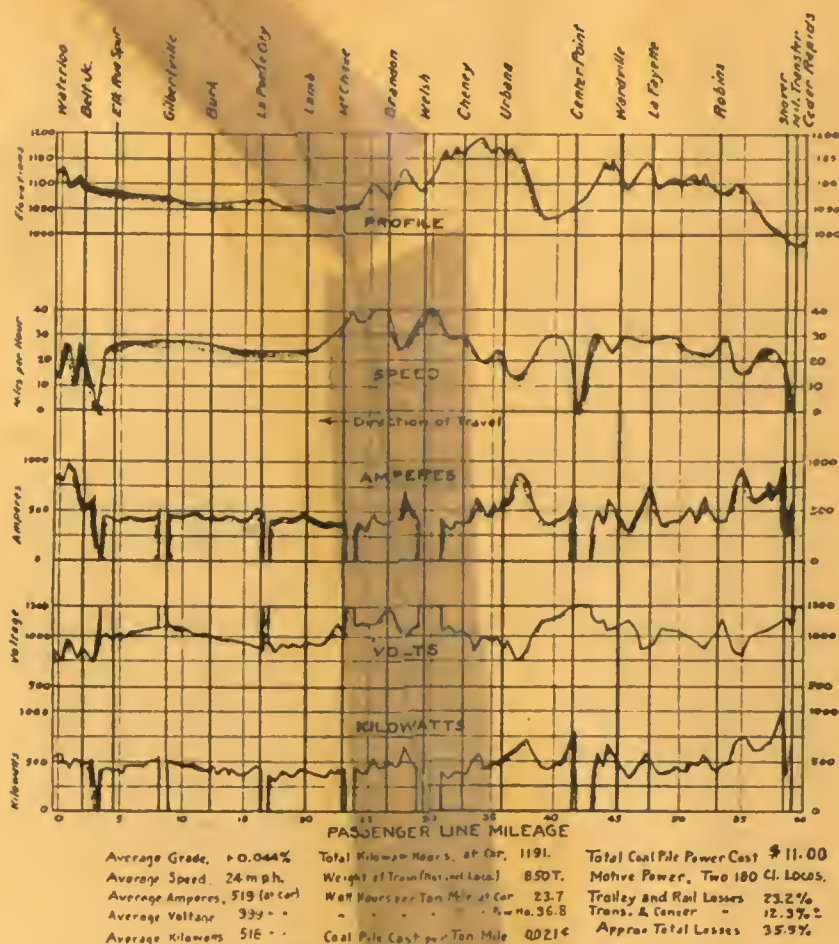
Is Easy to Install

*a tap of a mallet holds it
in the web of the rail*

Carey Elastite Rail Filler is a composition of specially-tempered asphalt and fibre which is used as a resilient cushion between the rail and the pavement absorbing traffic-impact, rail vibration and traffic-noise. It is pre-formed to fit any rail-section and is readily shaped on the job to fit any track-curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.



Figure It Out!



This is a performance diagram of the 850 ton, eleven-car excursion train of the Milwaukee Association of Commerce between Cedar Rapids and Waterloo, Iowa, on May 21, 1924, hauled by two standard 60 ton Baldwin-Westinghouse locomotives over the Waterloo, Cedar Falls and Northern Railway.

Ten interurban railways, operating a total of 56 locomotives, report an average figure of locomotive maintenance of 6.25 cents per locomotive mile.

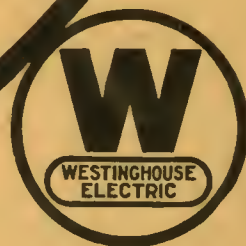
If these figures applied to freight interchange service with connecting steam roads, would it be profitable?

FIGURE IT OUT!



PERFORMANCE DIAGRAM
11 CAR STEEL PASSENGER TRAIN
CEDAR RAPIDS TO WATERLOO
MAY 21, 1924

The Baldwin Locomotive Works
Philadelphia, Pa.
Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.



Baldwin-Westinghouse

MORRIS RUCK
Managing Editor
JOHN A. MILLER, Jr.
Associate Editor
C. W. SQUIER
Associate Editor
O. J. MacMURRAY
News Editor

ELECTRIC RAILWAY
JOURNAL

HARRY L. BROWN, Editor

HENRY W. BLAKE
Senior Editor
CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
MERRILL B. KNOX
Editorial Assistant
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

CONTENTS

JANUARY 24, 1925

Editorials127
Surveying Suburban Traffic Wants.....129
Detroit Department of Street Railways now determining market for trackless trolley or motor-bus extensions in outer areas. Careful survey methods used to estimate revenues and expenses.
Light-Weight Interurban Car with Cabinet Control....133
A sample car being tried out on the Philadelphia & Western weighs 57,000 lb. and seats 56 passengers. Center doors without steps are used at flush platforms.
Continuous Transit Proposed for Atlanta.....136
Underground moving sidewalks in the business district are suggested in Beeler report as the most economical method of relieving sidewalk congestion.
Trolley Arrangement on Bascule Bridge.....139
By C. L. GREER.
Oldest London Tube Reopened.....141
After extensive changes taking ten years, including enlargement of the tunnel and modernization of the stations and rolling stock, the city railway has inaugurated through service with other London underground lines.
Zone Check System Used on P.-O. Interurban Lines.....143
By H. H. BEST.
Railway Equipment Used to Remove Snow by City....144
Graphs of European Tramway Statistics.....145
Association News and Discussions.....146
New Yorkers Discuss Interurban Service.....146
Light-weight cars, motor trucks, freight traffic and fare collection are taken up at the midwinter meeting of New York Electric Railway Association.
Freight Traffic—Its Source and Developments.....147
By F. W. BROWN.
Essentials of Discipline148
By F. S. MACY.
Light-Weight, One-Man Interurban Cars.....149
By J. M. ROSENBERG.
Gas-Electric Drive for Buses150
By J. C. THIRLWALL.
Philadelphia's Reasons for Gas-Electric Buses.....151
By J. A. QUEENT.
Light-Weight Interurban Cars.....152
By W. J. CLARDY.
American Association News.....154
Maintenance of Equipment155
News of the Industry158

McGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York

JAMES H. McGraw, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MUIR, Vice-President
E. J. MERRIN, Vice-President
MARION BRITTON, Vice-President
JAMES H. McGraw, Jr., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary
WASHINGTON:
Colorado Building
CHICAGO:
Old Colony Building
PHILADELPHIA:
Real Estate Trust Building
CLEVELAND:
Leader-News Building
ST. LOUIS:
Star Building
SAN FRANCISCO:
832 Mission Street
LONDON:
1 Boulevard Street, London, E. C. 4
Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations



Cable Address: "Mechinist, N. Y."
Publishers of
Engineering News-Record
American Machinist
Power
Chemical and Metallurgical Engineering
Coal Age
Engineering and Mining Journal-Press
Ingenieria Internacional
Bus Transportation
Electric Railway Journal
Electrical World
Electrical Merchandising
Radio Retelling
Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
American Machinist—European Edition
(Published in London)

The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries \$2 (total \$7 or \$8 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 30 cents.
Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.
Copyright, 1925, by McGraw-Hill Company, Inc.
Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office at New York, under the Act of March 3, 1879. Printed in U.S.A.

"Journal" Articles
Good Publicity Copy

RECENTLY, the JOURNAL contained an illustrated, descriptive article about new developments on an enterprising, small railway property. The publicity department of this railway appreciated the significance of the article and the nation-wide publicity given to it through the JOURNAL'S circulation. A number of reprints were requested for use in conjunction with the railway's local advertising campaign.

Representatives of local newspapers were given photographs of the development and copies of the article as it appeared in the JOURNAL. Within a few days, all dailies carried stories about the new car house and storage yard and the attractive surroundings.

Each newspaper story contained some mention of the JOURNAL'S story, as though the mere fact that the development had been given recognition in the JOURNAL was special reason for the story to appear in the local daily. A typical paragraph from one of the newspaper accounts reads as follows:

The new building and its trackage area have been the subject of nationwide attention. An illustrated article appearing in a recent issue of the ELECTRIC RAILWAY JOURNAL gives local enterprise credit for the creation of conditions which are far in advance of the time. Incidentally, it unfolds the information that additional expenditures will involve the sum of half a million dollars, as the ultimate value of the construction work.

Many articles appearing in the JOURNAL can similarly be used to good advantage in the local publicity campaigns.



Flat Beaded Air Brake Gaskets of "WABCO"

The remarkable success of WABCO Brake Cylinder Packing Cups has led logically to this development.

WABCO

WABCO material can now be obtained in a complete assortment of flat beaded gaskets for all parts of the Air Brake apparatus.

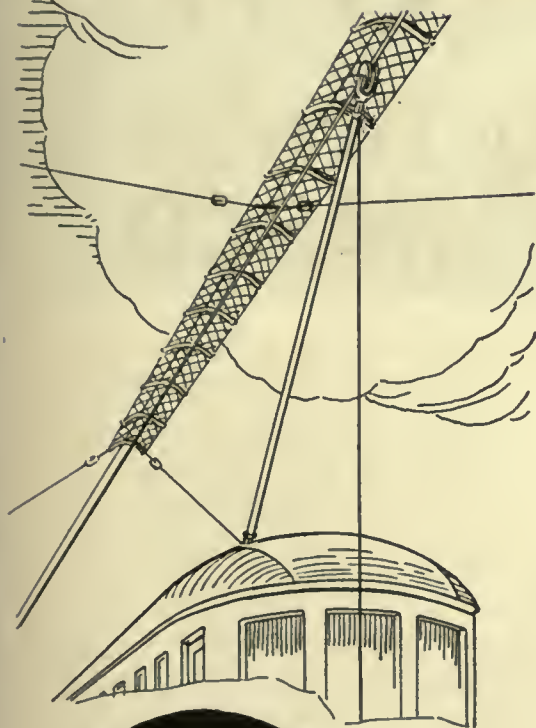
Since the entire manufacturing process is under our control, we are able to vary the material and its treatment to give any particular type of gasket the specific characteristics it needs.

By using WABCO Gaskets exclusively, you are assured of uniformly satisfactory service over long periods from this, a distinctive Westinghouse product.

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works: WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES



He'll Get Across!

This motorman has to meet a close-quarters situation and keep moving. And his chances are far better because he has no fear of losing his power. The trolley wire is protected with energized National Trolley Guard, which will carry him on even if his trolley wheel slips off the wire into the Trolley Guard mesh. He'll get across.

A National Trolley Guard installation discharges one of your safety obligations.

The Ohio Brass Co.
Mansfield, Ohio

B
LINE MATERIAL



BETHLEHEM Frogs, Switches, and Special Trackwork are produced in a separate department specially equipped for the manufacture of this product. This special department is backed by all the steel-producing, metallurgical, and engineering facilities of the Bethlehem Steel Company, assuring correct design and high quality in materials.

The carhouse layout shown above completely assembled under cover is a graphic illustration of quality in workmanship. Men working under cover are comfortable, and can produce better work and more of it. Layouts completely assembled and fitted under cover before shipment mean less labor in installation.

A partial list of Bethlehem products for the electric railway field includes rails, splice bars, bolts, spikes, tie plates, tie rods, pole line material, and rolled steel car wheels and axles.

BETHLEHEM STEEL COMPANY, General Offices: BETHLEHEM, PA.

Sales Offices:

New York	Boston	Philadelphia	Baltimore	Washington	Atlanta	Pittsburgh
Buffalo	Cleveland	Detroit	Cincinnati	Chicago	St. Louis	San Francisco

Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products

BETHLEHEM

If your general manager says:

“What About Steel Ties”

The first cost is low { Steel Twin Ties cost about One Dollar per track foot at Cleveland.
Economy of concrete and grading make the complete track cost less than any other concrete design.

The construction is renewable { Steel Twin Tie Construction provides a permanent foundation on which a complete and approved method of rail renewal has been worked out on over five miles of track.

The structure is uniform { A combination of track foundation and paving, uniform in its action under both car and vehicle traffic.
The coefficient of expansion of steel and concrete are nearly identical.

New methods of installation { New methods of initial installation, designed to insure complete bearing, eliminate shrinkage and make rail renewal easy.

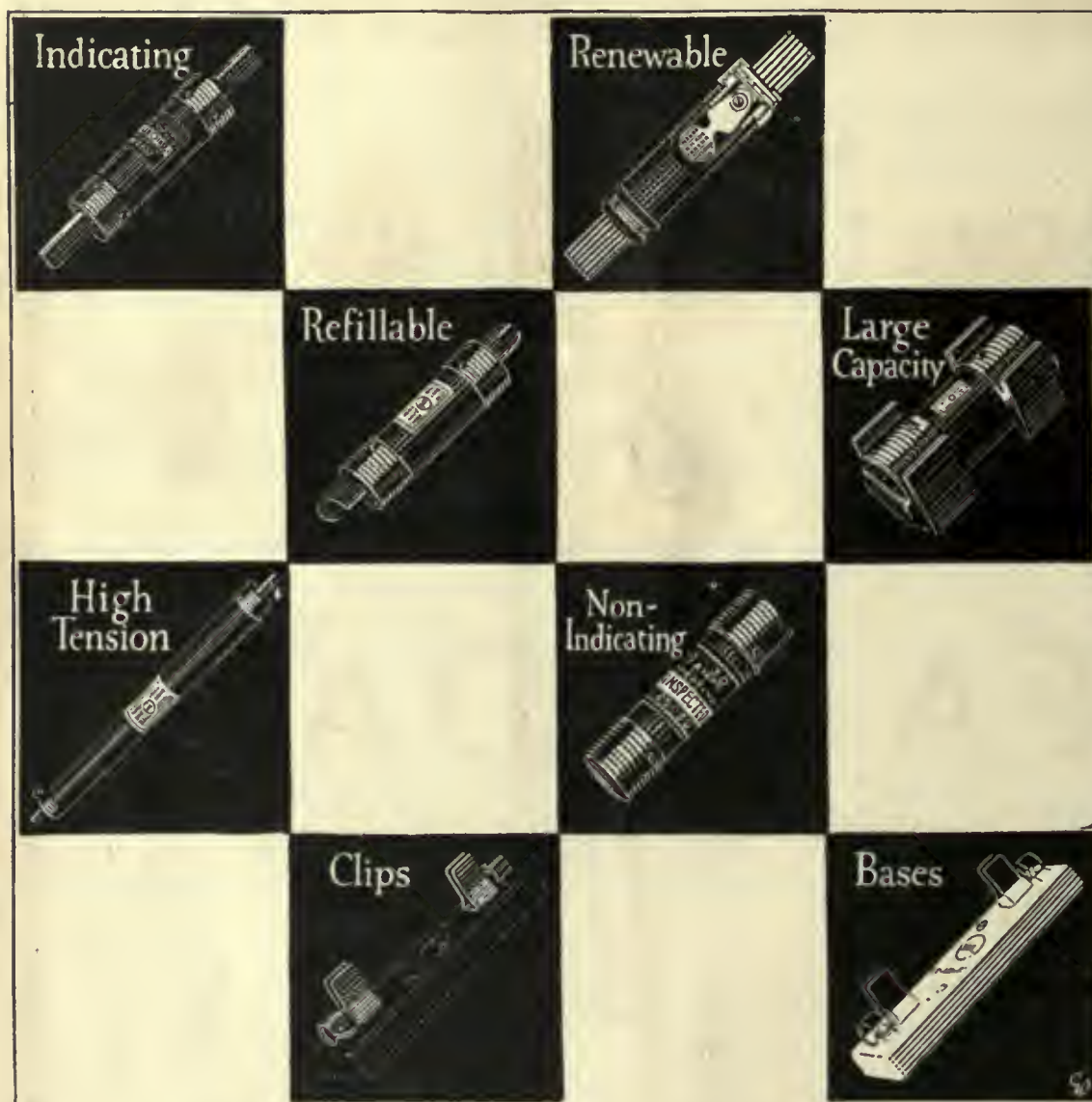
Experience of users can be obtained { Fourteen years of experience as to service, together with initial and maintenance cost is now available.

*Your quotation, accompanying the complete folder on Steel Ties,
is based on a stock of steel which guarantees you
a firm price on Steel Ties for the
first half of the year*

THE INTERNATIONAL STEEL TIE COMPANY, CLEVELAND

Steel Twin Tie Track

Renewable Track . . . Permanent Foundation



J-P

has the ability
and capacity
to serve you
in NINE ways



NOARK Fuses

1



NOARK Fuse Clips and
Bases

2



NOARK Service and Sub-
way Boxes

3



ALL-SAFE Switches

4



NOARK Universal Service
Entrance Switches

5



Railway and mine mater-
ial, hangers, insulators, etc.

6



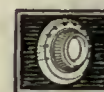
J-P molding service—
tract basis

7



VULCABESTON Packing
—sheet, rope, braided.

8



J-P molded radio parts—
from stock

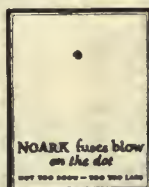
9

CHECK off the fuses you need

NOARK Fuses are particu-
larly intended for indus-
trial service—where NOARK cir-
cuit protection without unnec-
essary interruption saves most.

Whether you need fuses for
low voltage or high voltage,
low amperage or high
amperage, indicating
or non-indicating, re-
newable or non-renew-
able, the NOARK line
can supply it. For every

light and power circuit in
your factory, office or power
plant, there is a NOARK Fuse
exactly adapted to perfect pro-
tective service. At the same
time NOARK Fuses conserve
the large economies resulting
from elimination of ser-
vice interruptions arising
from needless blowing of
fuses. NOARK Fuses never
blow too soon or too late.
They "blow on the dot."



NOARK fuses blow
on the dot



TRADE MARK



REG. U. S. PAT. OFF.

THE JOHNS-PRATT COMPANY, Hartford, Conn.

Division of Colt's Patent Fire Arms Mfg. Company

BOSTON

NEW YORK

CHICAGO

SAN FRANCISCO

Export Department: 30 Church Street, New York, N. Y., U. S. A.

TRADE MARK



REG. U. S. PAT. OFF.

*Members of
the Keystone family*



No. 19103
Buzzer



Type A
Push Button



Type B
Push Button

FARADAY

The popular and efficient car signals

FARADAY means more than a buzzer or a bell, or a commonplace push button!

It means a complete and reliable system, comprising all parts essential to unfailing operation. It includes a wide latitude of choice to meet particular requirement—high or low voltage systems, buzzers, vibrating bells or single stroke bells, resistance panels, flush or surface type push buttons.

When Faraday Systems are installed, more satisfactory service is secured with almost negligible maintenance cost.

ELECTRIC SERVICE SUPPLIES Co.

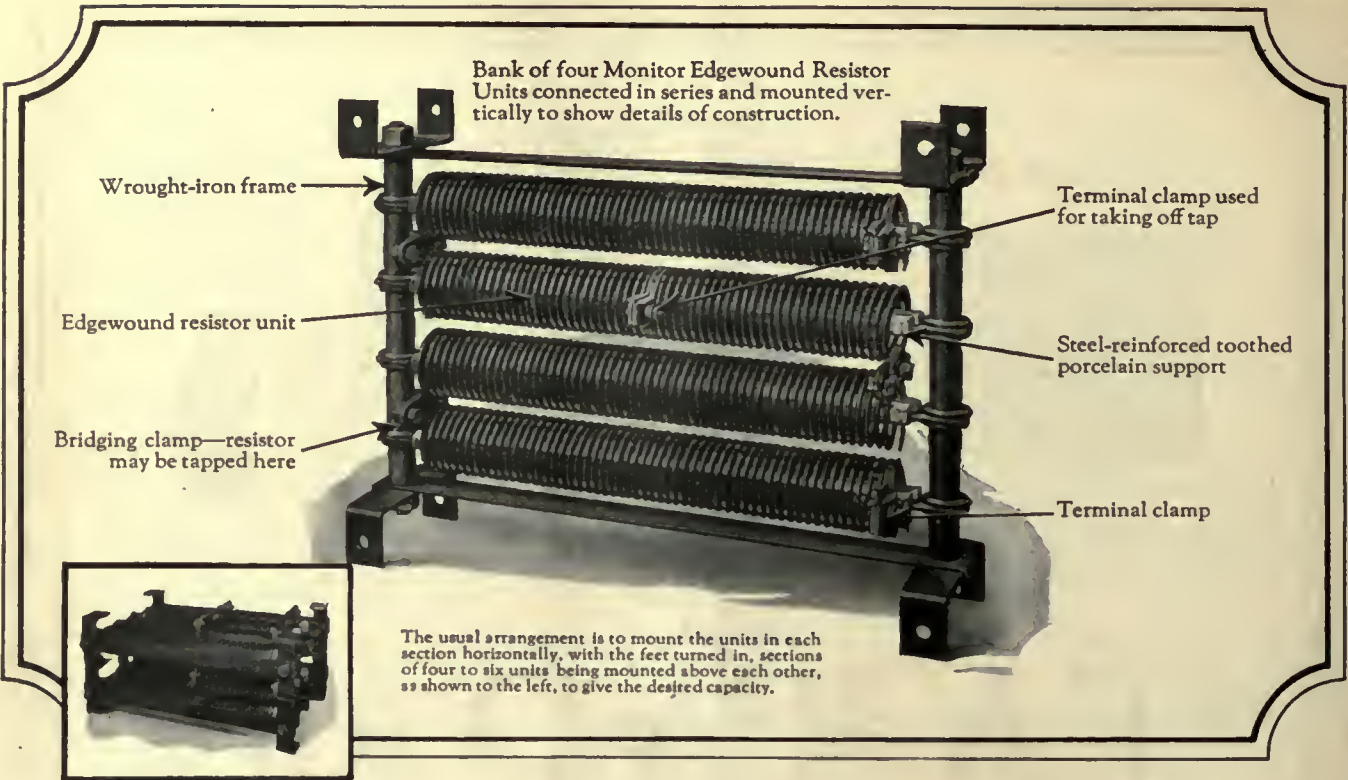
PHILADELPHIA
17th and Cambria Sts.
PITTSBURGH
829 Oliver Building

NEW YORK
50 Church St.
SCRANTON
316 N. Washington Ave.

CHICAGO
Monednock Bldg.
BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver





A new heavy-current resistor

Unbreakable — Compact — Light in Weight

THE insistent need for something better than cast-iron grids and equivalent forms of ribbon resistors led to the development of the Monitor Edgewound Resistor, which combines the best of each. Monitor Edgewound Resistors have the mechanical simplicity of the grid, the electrical characteristics of the ribbon and heat dissipating properties far greater than either.

Special alloy ribbon which is of uniform composition, moisture-proof, acid-resisting and of negligible temperature co-efficient of resistivity is wound on edge in helical form. Each unit is mounted on a steel re-inforced porcelain support which supports and separates every convolution at two diametricaly opposite points. This method of construction permits free radiation and convection of heat and relieves the units from mechanical strain, ena-

bling the resistor to be operated at any temperature up to red heat without sagging or injury.

Two simple forms of clamps provide facilities for connecting units in series or in parallel or for taking off taps at any desired points along the units.

The only joints are at the terminals of the sections whereas a cast-iron grid section has approximately 50 in addition to its terminals.

When rating the Monitor Edgewound Resistor at half the air temperatures permitted by the fire underwriters, the ratio of volume for a 4500-watt rheostat is 1 to 1.5 and the ratio of weight 1 to 1.65 when compared to an equivalent cast-iron grid resistor.



Complete information about this new resistor is given in Bulletin 107, which will be sent to you on request.

Monitor Controller Company, 500 E. Lombard St., Baltimore, Md.

Birmingham
Boston

Buffalo
Chicago

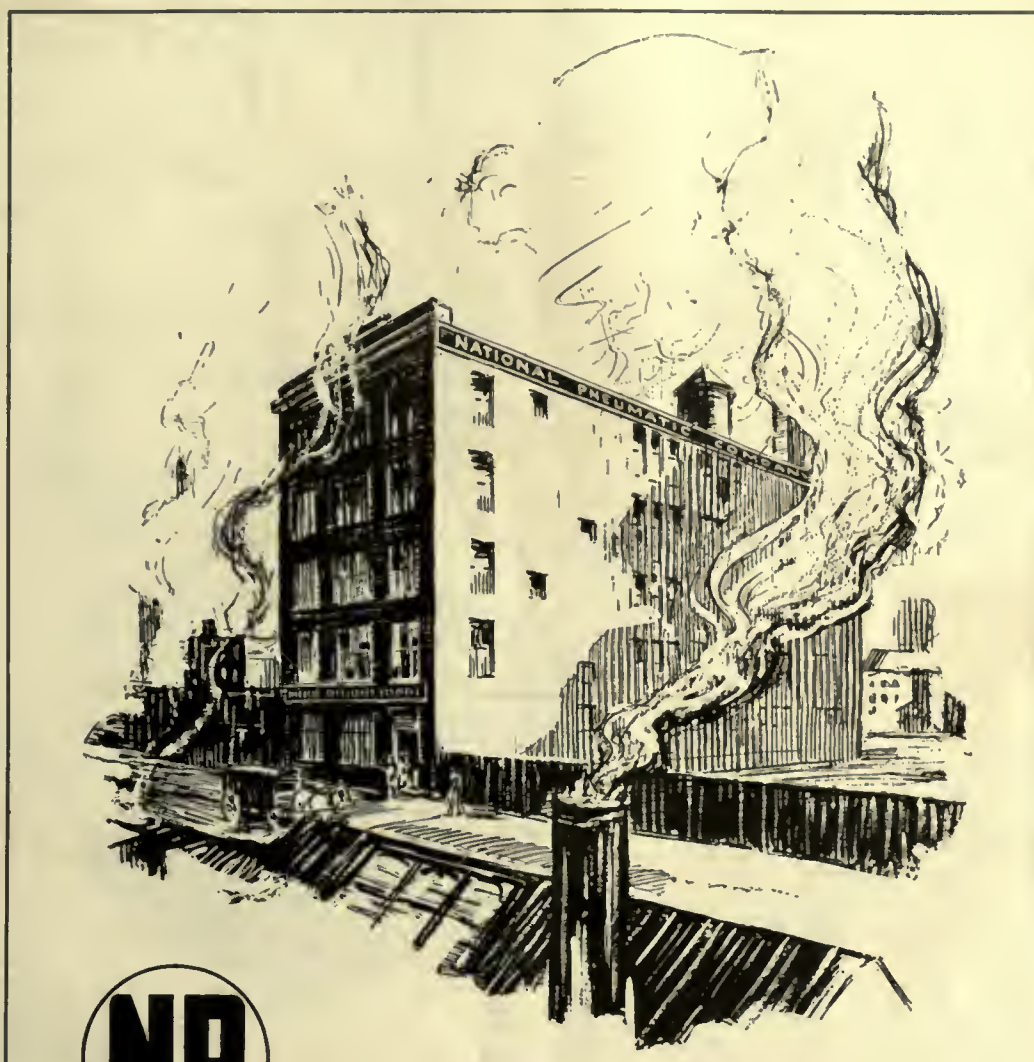
Cincinnati
Cleveland

Detroit
New Orleans

New York
Philadelphia

Pittsburgh
St. Louis

Monitor Edgewound Resistor



The solution of traffic-handling problems, through efficient door and step arrangement and systems of control, was inaugurated in this building—a small plant in Chicago—many years ago. The national demand, and then the world demand, for N. P. Door and Step

Controlling Mechanisms grew so rapidly, however, that we were obliged to erect and equip a plant of many times this capacity.

The modern N. P. plant at Rahway, N. J., will be illustrated and described in our next advertisement.

NATIONAL PNEUMATIC COMPANY

Executive Office, 50 Church Street, New York

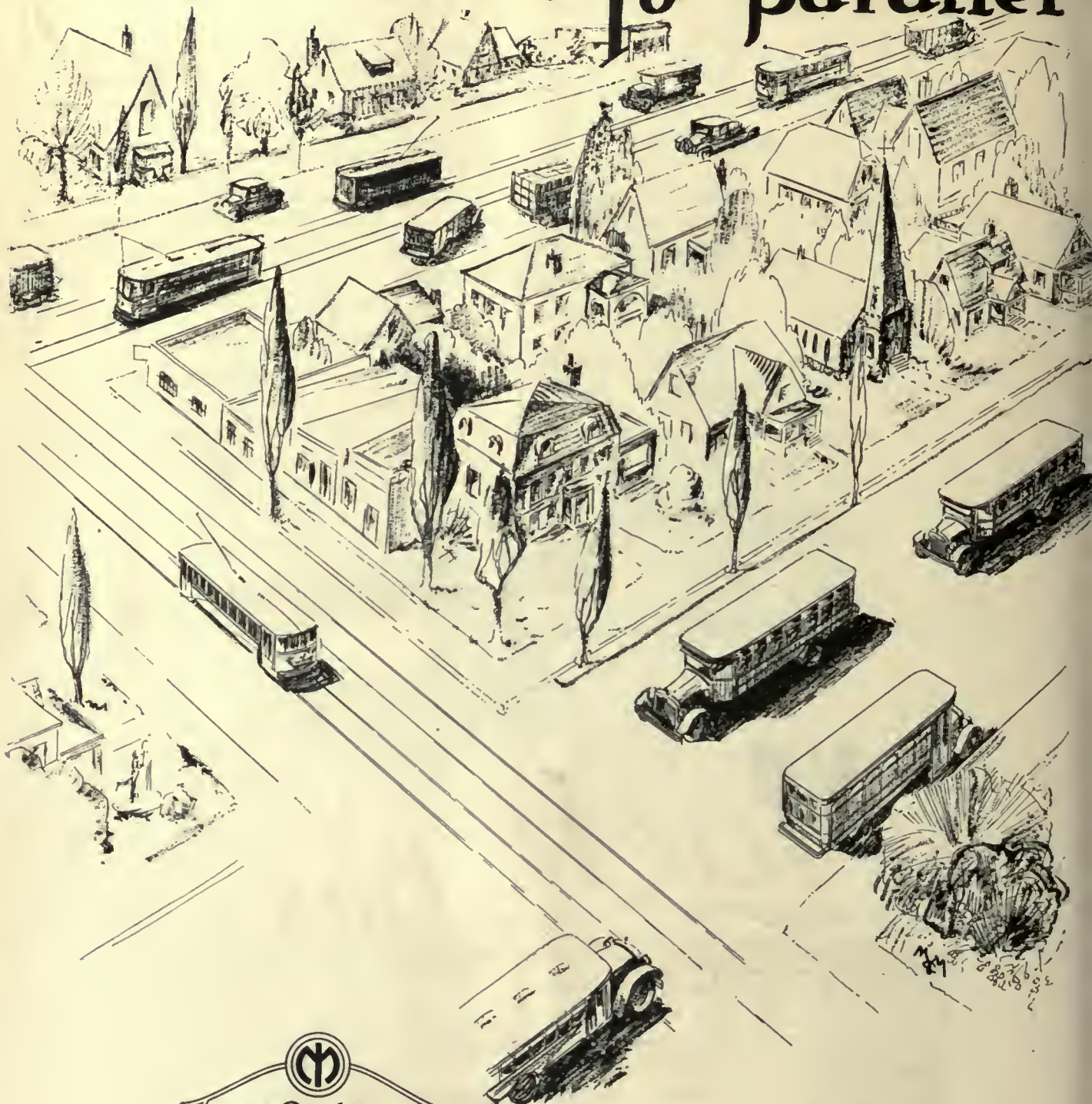
General Works, Rahway, New Jersey


CHICAGO
McCormick Building

MANUFACTURER IN
TORONTO, CANADA
Dominion Wheel & Foundries, Ltd.

PHILADELPHIA
Colonial Trust Building

For parallel




1900 1925
For a full quarter
century Mack interests
have been centered
on the
manufacture of
transport vehicles

Boulevard service at higher fare!

AMPLE evidence exists, in many American and Canadian cities, that the public demands fast deluxe bus service operating on Boulevards and the more exclusive streets paralleling existing car lines, even though the buses be operated at a higher rate of fare than the cars.

Such a condition arises from the fact that a large class of people, who ordinarily make their way about town in private automobiles, will readily use the buses when they are available and where the accommodation offered is comparable with their standards of comfort.

There is no reason why such additional transportation service should pass into the hands of independent operators when it might well help to swell receipts of the established electric railway company.

In the Mack Bus, electric railway operators find a

vehicle particularly well adapted to such service—a luxurious, smooth riding bus in which beauty and sound practical utility have been efficiently combined.

The Mack Bus is all bus from bumper to tail light.

It shows in the good Mack Engine.

It shows in Mack Shock Insulator Suspension.

It shows in the long wheelbase and wide front axle; in the dual reduction "all bus" rear axle designed to give "straight-line" transmission with ample underbody and ground clearance.

MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY

25 BROADWAY

NEW YORK CITY

Eighty-three direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

The Mack Bus



25 Passenger, City Type

Performance counts!



Collier Service

A nation-wide
organization
building and
sustaining car
card advertising
space values



Barron G. Collier, Inc.

Candler Bldg.
New York



U. S. Truck-Bus Tires Used on Trucks of Third Asiatic Expedition

THE above photograph shows two Fulton Trucks ordered and used by Roy Chapman Andrews on the Third Asiatic Expedition which over a period of three years conducted explorations in the Gobi Desert of Mongolia.

It was the first time, according to Mr. Andrews, that motor cars had been used successfully in extended explorations and the important results of the expedition were largely due to this method of transportation.

One of the most important features in the successful use of motor transport in this expedition, was the splendid service given by the U. S. Tire equipment.

The motors of the expedition traveled about 10,000 miles, largely over country where there were no roads.

The tires were subjected to the most

severe treatment. Sand, ruts, rock and mud were their portion.

Because of their demonstrated ability to stand up under the worst conditions, U. S. Truck-Bus Tires were chosen and rendered splendid service.

The U. S. Truck-Bus Tire is scientifically designed for commercial service. It is built of Latex-treated Web Cord and Sprayed Rubber; is of extra heavy construction with a scientifically developed tread design that gives positive traction and non-skid protection.

The same splendid results secured by the Third Asiatic Expedition from their U. S. Truck-Bus Tires is being secured every day by owners of commercial vehicles who have adopted this tire as standard equipment.

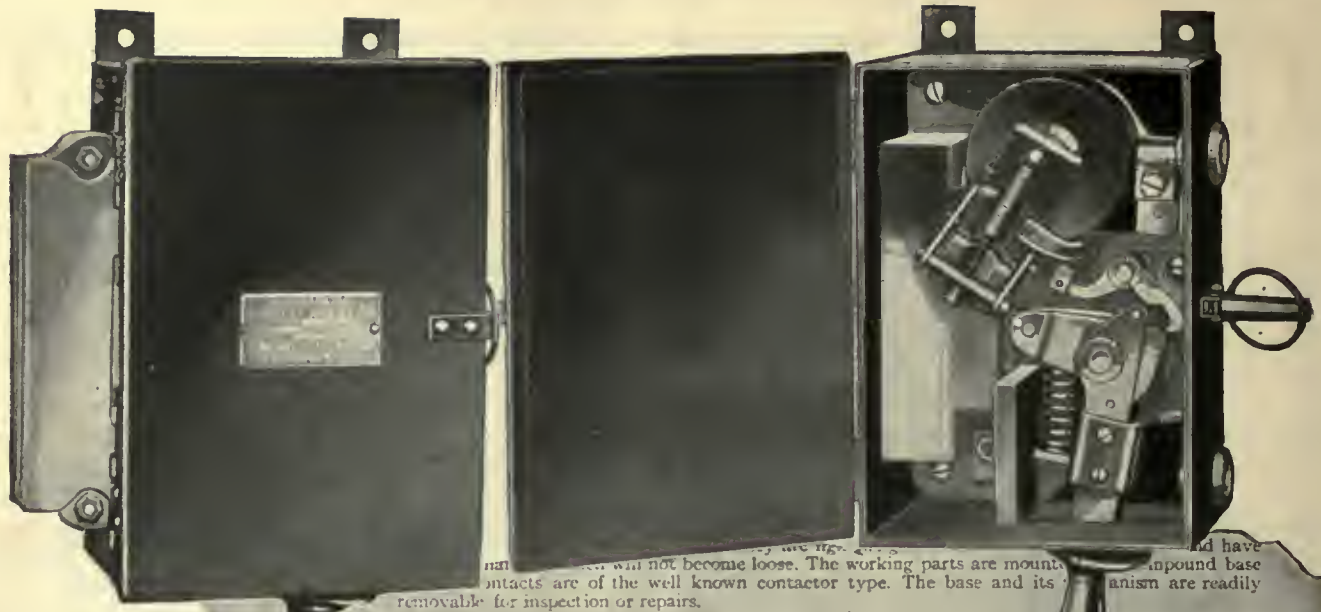
Built in sizes from 32 x 4½ up to and including 40 x 8 inches.

United States Rubber Company



Trade Mark

UNITED STATES TRUCK TIRES ARE GOOD TIRES



will not become loose. The working parts are mounted on a compound base. The contacts are of the well known contactor type. The base and its mechanism are readily removable for inspection or repairs.

Continuous Rating in Amperes	Range of Calibration	Total H.P. Capacity at 600 Volts	Type	Cat.	Net Wt. in Lbs. Ea.
18	25-50-75	0-40	MR-20	247524	22
70	100-200-300	41-80	MR-21	247525	22
140	200-400-600	81-160	MR-22	247526	22
240	350-700-1000	161-260	MR-23	247527	22

From page 176 of your G-E Catalog



Your Text Book on Equipment Standards

—Simplicity—

That's the outstanding feature of this new type MR Circuit Breaker. And the way this breaker has won favor among railway men is conclusive evidence that its design is sound.

The new type MR Breaker is very light in weight, enclosed in a sheet steel box. Its contacts are of the so-called contactor type, and many of its features represent radical improvements in design.

If you are not familiar with this new breaker, let the nearest G-E Office arrange with you for a demonstration. It will be worth your while.



General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

GENERAL ELECTRIC

New York, Saturday, January 24, 1925

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HARRY L. BROWN, Editor

Volume 65
Number 4

"What Would You Do?"

OUT of the welter of editorials printed every day in the newspapers throughout the country there emerges every so often a message so poignant, so forceful, that it deserves wide circulation. A writer in the *Philadelphia Public Ledger* has risen to the occasion in an editorial about the fellow prone to kick about street railway service even in the face of those trying conditions that often beset the street railway management. The excuse for his comment was the recent severe storm in the East that played havoc with transportation everywhere and resulted in delays, disorder and general disruption of service. His plea is for fair play, the boast of the average American. He does not wonder that patience sometimes breaks under the strain of transportation delays, but he points out that the time is one "for philosophical endurance and for that give-and-take without which intercourse with our kind would often be intolerable."

The question that is asked is "What would you do?" The editorial is significant because its every line reflects the attitude which the writer asks his readers to observe. The United Railways & Electric Company, Baltimore, has reprinted it for distribution among its patrons, asking for their suggestion. The editorial, reproduced in full elsewhere in this issue, lends itself to a purpose of this kind.

Constantly increased use is being made by electric railways of similar expressions of editorial opinion. The particular editorial, less than 400 words in length, not only is fair in its presentation, but in it the writing virtues of clearness, force and simplicity are so compounded as to commend it to the thoughtful consideration of car riders everywhere.

Must the Railway Remove Snow from the Whole Street?

IN ONE of the large cities a very severe snowstorm recently brought all traffic virtually to a standstill. The manner in which the local railways suffered was particularly trying. The companies spent large sums of money to keep the tracks open. While their plows were effective, they piled the snow up outside the tracks and, of course, all vehicles traveled on the track area.

This unfortunately is the usual course of events, but in the case referred to the storm was so heavy that as this issue of the paper goes to press, three weeks after the storm, the snow at the sides of the streets on many of the car lines has not yet been cleared away by the city. Thus vehicular traffic has continued to occupy the trackway and has had the effect on railway schedules instanced by the following typical line.

Under normal conditions a car on this line makes 14 round trips of 40 minutes elapsed time each within the

working day of a crew. Now, three weeks after the storm, a crew is making six round trips a day and the elapsed time per round trip is from 2 to 2½ hours.

In a way it seems out of place to suggest adding further to the burdens already heaped upon the railway for its use of the streets. Yet such a serious slowing up of the service with its consequent large loss of revenue, gives rise to the question of whether it would not pay the railway to have special equipment to assist the city in removing the accumulation of snow at the sides of the streets along car lines. Some companies are already doing this through the use of specially equipped motor truck plows and snow loaders, but most of them have hesitated to engage in such extra work.

In the absence of such snow removal equipment, the tracks might almost as well not be cleaned either, because the cars are of no value to the public if their movement is reduced to a speed considerably below that of walking. In the case in point, the cars have been virtually empty much of the time, though ordinarily they are well patronized with a headway of about 2 minutes.

Making Transportation Extensions Pay Their Own Way

ALMOST everybody realizes today what a heavy price American electric railways have paid and are still paying for the old policy of building extensions almost as fast as residents and real estate interests demanded them. The price was made all the heavier through the policy of granting the same flat fare for the longer ride into thinner territory.

A few years ago, Cleveland, as the leader in service-at-cost, called the turn on this way of adding to the landowner's unearned increment at the expense of the general car-riding public by insisting that the persons benefited by an extension must be willing to help find the money for it through purchase of securities. More recently, Baltimore has gone still further with realty developers by asking not for assistance in finding capital but for a guarantee against operating losses over a period of years. In Madison, Wis., a similar guarantee against loss to the railway was provided in 1919 by a manufacturer who had built a new plant beyond the end of the car line.

Now the Department of Street Railways, city of Detroit, gives acceleration to this tendency with the announcement of the Baltimore principle as a definite policy for all demands for extensions. This may surprise those who believe that a municipally-owned transportation system is necessarily obligated to extend and extend without regard to the effect on its finances. Unlike a private company, the city gains an increase

in tax values as a partial or complete offset to operating losses on the transport facilities that produce the increase in such values, but that is not a sufficiently good reason to throw financial caution to the winds and give the land speculator something for nothing. From a city planning standpoint, also, the idea suggests itself that through control of the transport body and the latter's surplus revenues, etc., the municipality can exercise praiseworthy pressure as to the character of new housing developments.

While the Detroit traffic survey article in this issue gives many further particulars, one thought should be put forward here in connection with these surveys: The Department is actually putting it up to the people who will do the paying to decide for what they will pay!

Not What Is Heard, but What Is Used, Is Important

ONE of the speakers at the New York Electric Railway Association meeting this week, W. W. Paige, emphasized effectively a point that might be taken to heart by all railway men. The value of the meetings to the individual is not in listening to the speakers, not in taking part in the discussions, nor even in presenting a paper. Neither is it in what is retained after the delegate gets back home. All of this is merely for the edification of the individual. But what really counts is what portion of what is learned is actually put into use.

The papers at this meeting were well chosen and well presented. The discussion was above the average. Moreover, practical topics were taken up that should prove an inspiration to those who attended, and also to those who read the report of the sessions in this issue. Let each person see to it that he digests the matter he has heard or read—and sees how much he can use effectively on his own property.

Light-Weight Cars Solve Difficult Interurban Problems

MODERNIZATION of interurban railway rolling stock was a topic of more than passing value taken up at the midwinter meeting of the New York Electric Railway Association held Jan. 22. The papers on recent types of light-weight interurban cars and the discussion which followed showed that there are great possibilities from their use in building new passenger business and reducing operating costs.

An important point is that the old idea that a minimum weight of 1,000 lb. was necessary for each mile per hour of maximum speed perhaps does not apply any more. Cars with not more than 75 to 80 per cent of the weight dictated by this rule are now operating with complete success at speeds of 50 to 60 m.p.h., according to one of the speakers.

The use of safety devices similar to those developed for city service have made it possible on some lines to operate these light-weight cars with one man. Combining a reduction in labor costs with lowering of other operating and maintenance costs, it has been found feasible to give much more frequent service, and so to attract riders who would not consider the long waits necessary with the heavier cars.

This is a development that merits attention on many other interurban systems, as in numerous cases seem-

ingly hopeless operating situations may be retrieved and service retained where otherwise the property would have to be abandoned.

Divided Opinion Over Future of Boston Elevated

APPARENTLY a fight impends in the Legislature as to the future course of the state with respect to the operation of the Boston Elevated Railway. The period of public control expires in 1928. With this in mind a recess committee of the Legislature has been considering the future of that property and it has just reported in a divided opinion with a 5 to 4 vote.

The majority report recommends that no action be taken by the Legislature this year on the matter, pending further recess study of the whole problem; that no authority be extended the public trustees to obtain further capital and that the question of further additions and improvements be held in abeyance for another year as well as the matter of the continuance of public control. The salient feature of the minority report is that it recommends the immediate enactment of legislation to extend the period of public control twenty years. The majority says little can be done in the way of increased facilities or extensions without a further increase in local fares, if not also in the basic fare now fixed at 10 cents. For these reasons the majority believes that any increased capital expenditures should be made only with the utmost caution. The minority says it sees no reason for drawing such a conclusion from the present condition of the finances of the Elevated. With it all there is involved the question of providing a comprehensive metropolitan transit plan.

The reports and everything pertaining to the subject will be referred by the Legislature to the committees on metropolitan affairs and street railways, sitting jointly. Senator Warren, who signed the minority report, is chairman of the metropolitan affairs committee, and Representative Richards, also a signer of the minority report, is chairman of the street railways committee for the House. It is argued that this situation will likely result in a favorable report on the present minority report. The report would then go to the House Ways and Means committee of which Senator Shattuck, who wrote most of the present majority report, is chairman. It is believed he would fight to have that committee substitute the recommendations of the majority report.

This Boston situation is of wide general interest because in effect the merit of the state trustee plan of operating local railway systems is the issue. The outcome will be to determine whether the present plan will continue, give way to complete public ownership and operation, or revert back to complete private operation.

Not a Straphanger System

THE Denver Tramway Company has removed all straps from its car bodies on both city and interurban lines. This has been done in connection with increased service to impress upon the public that this was not a straphanger service but that the aim of the company was to provide a seat for everyone. Of course it is impossible to do this in the rush hours, and standees then can take hold of the handles on the car seats, all longitudinal seats having also been done away with. But there is something to the public psychology obtained from this removal of the straps.

Surveying Suburban Traffic Wants

Detroit Department of Street Railways Now Determining Market for Trackless Trolley or Motor-Bus Extensions in Outer Areas—Choice of Transit Means and Guarantee Against Loss Put Up to Parties Interested—Careful Survey Methods Used to Estimate Revenues and Expenses

ACCORDING to the charter of the city of Detroit, its Department of Street Railways may, upon the consent of the local suburbs involved, extend its transportation service to points 10 miles beyond the municipal limits. During the first year or two, the department was too much occupied with the rehabilitation of the acquired system to meet requests for service from the outer districts, but with the worst of this work behind it the management is now able to give attention to the expansion foreseen in the charter provision.

If the department were to believe the enthusiastic forecasts of the realtors, the mileage of the system would increase by leaps and bounds. However, so long as the municipal street railway is conducted on a self-sustaining basis, progress must be made somewhat more cautiously. For this reason and because of the possibilities of using trolley, motor bus or trackless

trolley for different situations, the Department of Street Railways has undertaken to solve the problem of extensions in a more thorough manner than has been customary in the past.

The plan is simple. Without drawing upon outside aid or adding largely to its operating expenses, the department is conducting surveys of district after district to determine three things: First, the market for transportation; second, the kind of transportation desired; third, the willingness of the local public to meet the cost of such transportation. The procedure is outlined in the following paragraphs.

SURVEY STAFF IS ORGANIZED

On the map of Detroit and environs published herewith have been drawn the outlines of the different districts "A" to "Q" surveyed to date. It will be noted that they are of all shapes and sizes, aside from



Map of Portion of Detroit Suburbs Showing Areas in Which Traffic Surveys Are Being Made

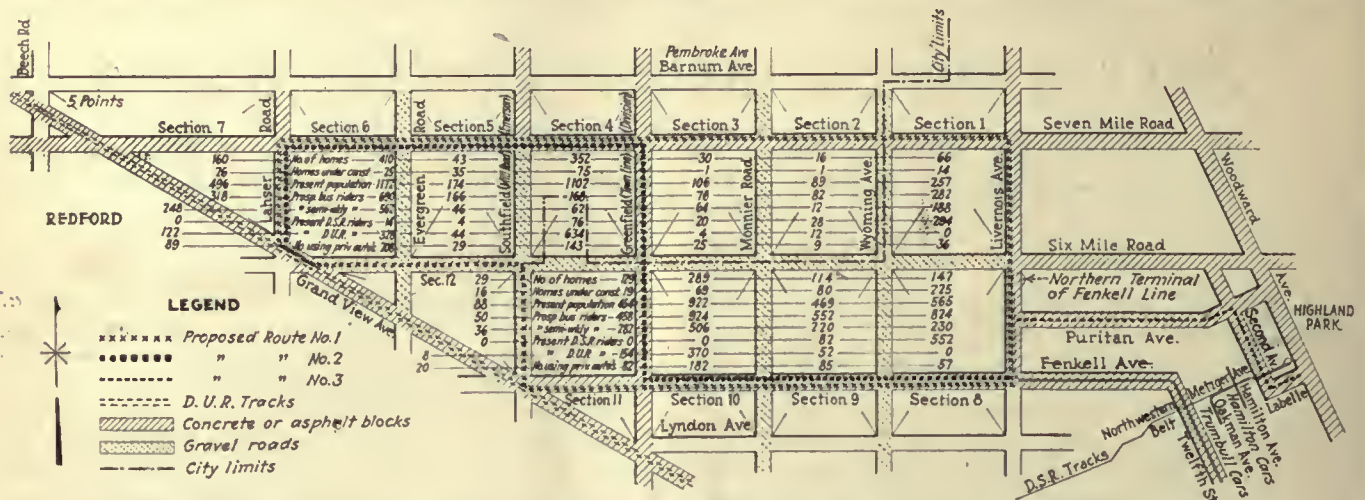
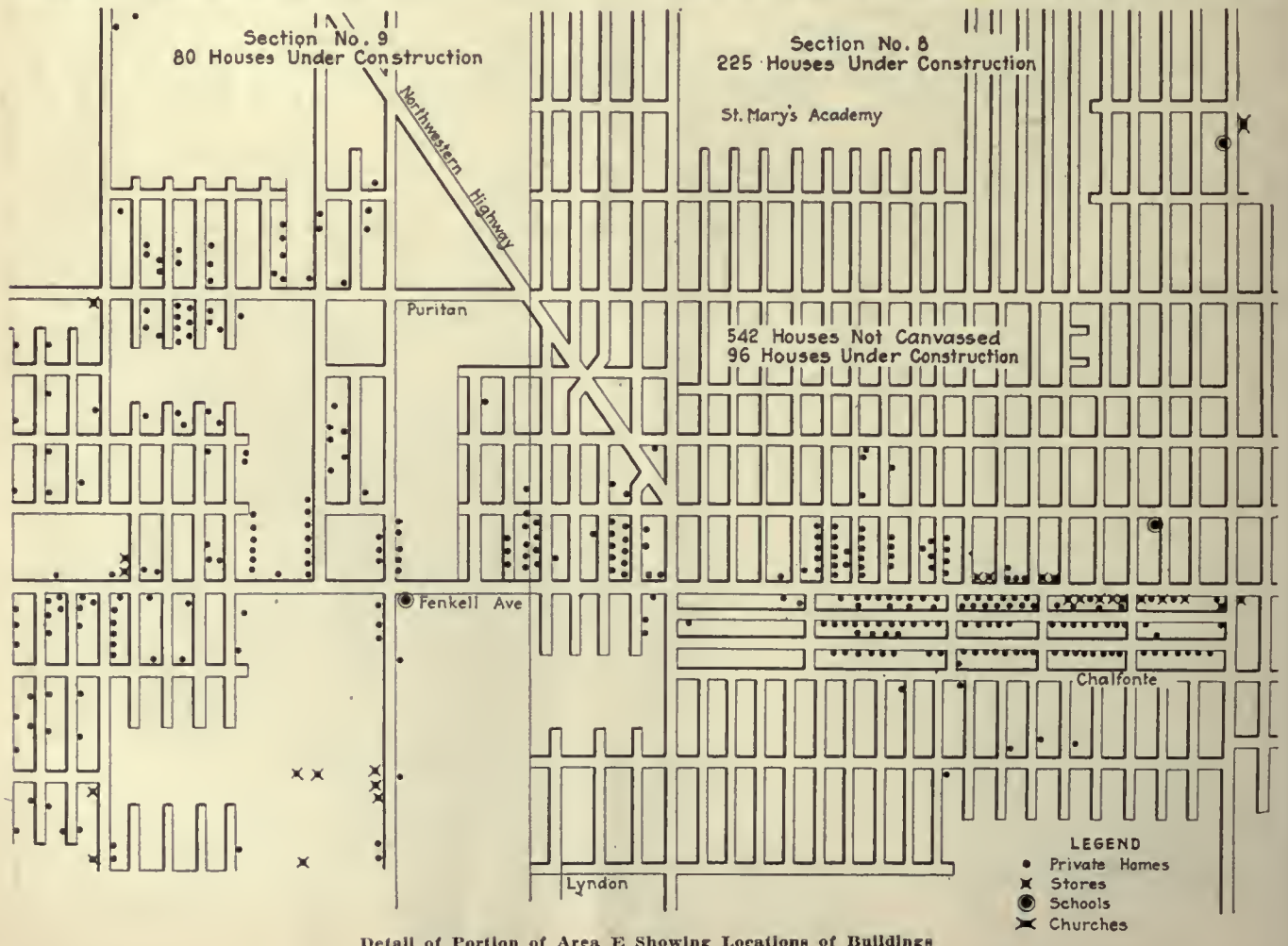


Diagram Used for Summarizing Results of Traffic Survey of College Park and Grand River Association Districts. The Sections Are 1 Mile by 1 1/2 Mile

political overlaps. Each survey was undertaken at the request of interested individuals or associations in the territory with a D. S. R. traffic survey crew selected to make a house-to-house canvass. These crews have been drawn from the staff of the supervisor of traffic, from the electrical engineering division, from chauffeur forces—in fact, from any department where men of the right class were available. All of these investigators were placed under the direction of Frank Peppler, who acted as chief of the survey and as the usual speaking representative of the department at meetings and discussions with those who had urged extension of service to their territory.

One of the most detailed canvasses was that made in area E on the map, which is bounded by Seven Mile Road, Livernois Avenue, Fenkell Avenue and Grand River Avenue, an area of approximately 21 square miles. Through the economical methods employed by the department and the co-operation of the College Park and Grand River Associations, which are in the eastern and western parts of this district, the survey cost only \$50 per square mile. As the methods followed were typical, an account of them will be given: In the spring of 1924 these associations broached the matter of a conference on service. The suggestion was then made that the businesslike way to look into



Detail of Portion of Area E Showing Locations of Buildings

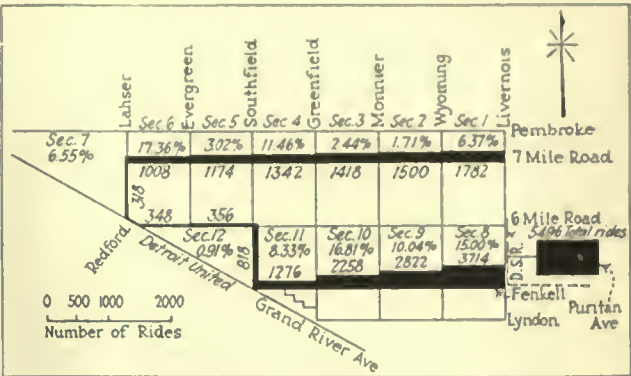
the matter would be to make a detailed survey. Thereupon, the department placed in the field a crew of six to eight men with three or four automobiles. These men made a house-to-house canvass, carrying with them a letter from Ross Schram, secretary (now general manager), and a short questionnaire, which are reproduced elsewhere. The questionnaire asks for the number of adults and children in the residence; the number of daily riders and the times they ride; the lines then used; the particular boarding places that would be used if routes were installed on certain streets; whether use is made generally of the personal automobile, motor bus, Detroit United Railway or the Detroit Municipal service.

In this particular case, trackless trolleys had been discussed. This accounts for the specific mention of trackless trolley buses in Mr. Schram's covering letter. As a matter of fact, the realty interests had expressed a preference for trackless over gasoline buses in the belief that the presence of a "dug-in" transport route would be more helpful in selling lots and houses than a mobile motor-bus route. While the department had no special choice in the matter, it was considered good policy to have every canvasser carry with him a photograph of a trackless trolley so that the householders would know just what they were voting for. This area, by the way, has one gasoline bus which gives rather sporadic service and so inclines the public toward something that is more tangible.

The field check covering the number of houses built or under construction in this area E was completed in about 10 days. One of the maps covers part of the area E, showing how the settlement data were tabulated under the headings of "private homes," "stores," "schools" and "churches." In cases where the houses were too numerous to spot separately, a number was used. From this information and from the answers to the questionnaire, there was prepared a corresponding locality map on which are shown by square miles, in relation to the proposed and existing routes, the number of homes in service, of houses under construction, present population, prospective daily bus riders, prospective semi-weekly bus riders, present Detroit United riders, present Detroit Municipal riders and present private automobile users.

In addition to these data, further graphs were prepared to show the expected densities of traffic along the streets corresponding to the proposed routes. One of these graphs is reproduced herewith. Incidentally, these graphs show how far most of the residents now have to travel to the existing trolley facilities of the Detroit United and Department of Street Railways.

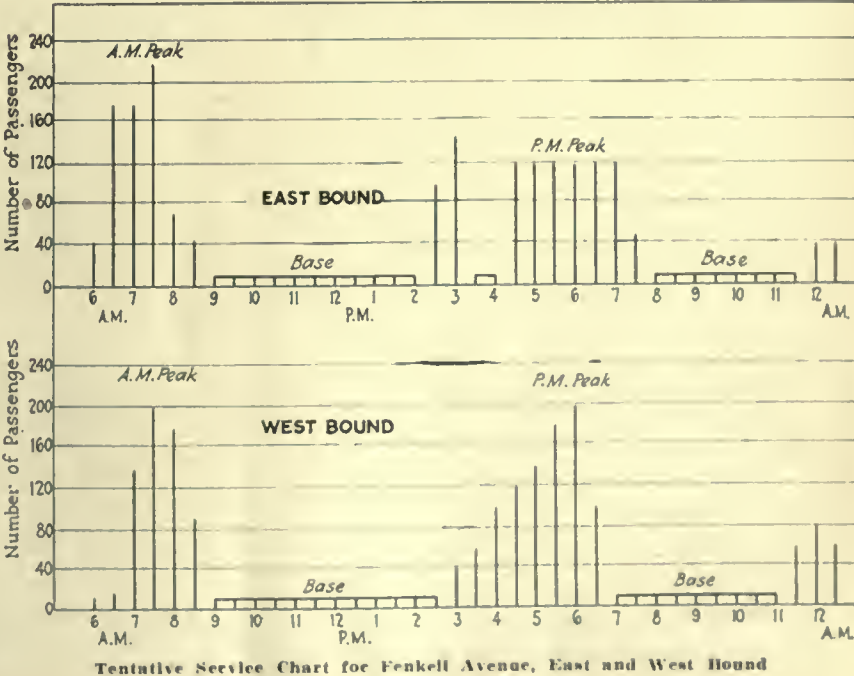
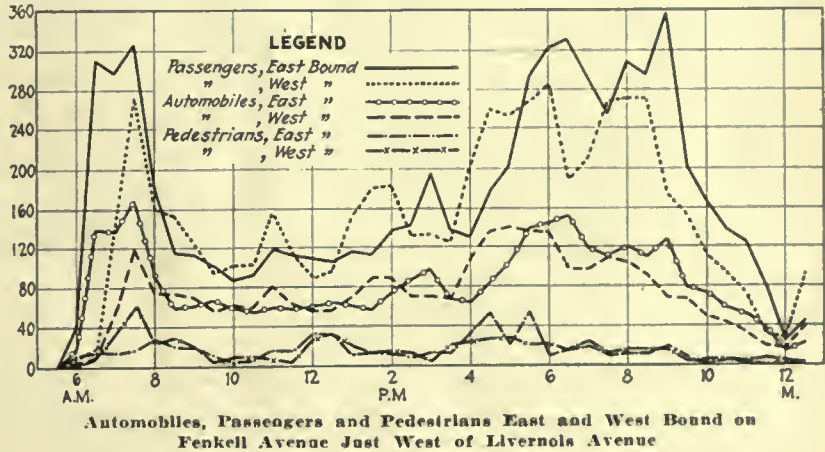
As a check on the house-to-house canvass, the department tallied the actual car, auto and pedestrian traffic



Estimated Density of Traffic Along Proposed Route No. 1
Large figures indicate prospective daily riders, and per cents indicate relative number of riders from each section

by half-hour periods on Fenkell just west of Livernois Avenue, as summarized in one of the charts. A similar summary was made for Seven Mile Road just west of Livernois Avenue. The automobile graph covers passengers.

When the foregoing data were submitted to the associations interested, the latter suggested study of the possibilities of a third route, viz., a line tying in with the Livernois route at Puritan, extending along Puritan



CITY OF DETROIT
Department of Street Railways

TRAFFIC SURVEY—NORTHWESTERN DISTRICT

The Street Railway Commission has been asked to make a complete survey of the residences in this vicinity for the purpose of laying out routes for the operation of trackless trolley buses.

In order to have complete and accurate data, the commission will appreciate your answering the questions asked by its representative.

BOARD OF STREET RAILWAY COMMISSIONERS,
ROSS SCHRAM, *Secretary*.
May 21, 1924.

Letter from Street Railway Management Transmitting
Questionnaire

and down Second Avenue to LaBelle, to terminate at the Highland Park plant of the Ford Motor Company. This is designated as Route No. 3 in the map.

The next step was to make an approximation of the relative costs of gasoline and electric bus service for Routes 1, 2 and 3 in area E. The figures are presented in an accompanying table. They are based on general experience in a variety of places and include the following assumptions: 19½-hour service; 50 per cent standees in rush hours; power cost either 2.5 cents per kilowatt-hour or 2.6 cents per mile (6 miles per gallon) for gasoline. The annual gross expenses are higher for the gasoline bus, but not enough to suggest any noteworthy superiority of the trackless trolley on this account. The figures do not attempt to cover a possibly greater earning power of the more flexible gasoline bus that might offset the higher over-all cost. As part of this study, the department has conducted power demand tests of

one and two-motor trackless trolleys. These will be described in a future article in this paper.

It is of interest to add here that later the Grand River Association asked that like studies be made in area Q, as already done for C, D and E, but in this instance a motor-bus catalog was added to the equipment carried by the interviewers to permit the public to see just what they would get with either trackless trolley or motor-bus operation.

Tentative service charts were prepared for Fenkell Avenue east and west bound and on Seven Mile Road east and west bound on the assumption that the service

DETROIT SURVEY, SHOWING INVESTMENT AND OPERATING COSTS FOR TRACKLESS TROLLEY AND GASOLINE BUSES ON SAME ROUTES

	Route 1		Route 2	
	Trackless Trolley	Gasoline Bus	Trackless Trolley	Gasoline Bus
Investment.....	\$349,439	\$211,000	\$255,857	\$173,000
Fixed charges.....	50,979	40,343	37,657	33,553
Operating expenses.....	159,279	178,240	112,062	125,413
Annual gross expense.....	210,258	218,583	149,719	158,966
Annual gross expense to provide sinking fund to retire bonds in 25 years at 5 per cent compound interest.....	217,589	223,004	155,080	162,591
Injuries and damages reserve (based on Detroit Motor Bus, 1923) \$5.20 per 1,000 passengers.....	9,708	9,708	7,394	7,394
Buses required.....	20	20	16	16
Annual passengers.....	1,866,990	1,866,980	1,421,980	1,421,980
Base headway, minutes.....	15-20	15-20	15	15
Peak headway, minutes.....	5	5	7½	7½

TRACKLESS TROLLEY ON PURITAN, LIVERNOIS TO SECOND, AND SECOND TO LA BELLE

	Route 3	
	Trackless Trolley	Gasoline Bus
Investment.....	\$43,246	\$19,750
Fixed charges.....	6,229	4,017
Operating expenses.....	14,336	16,040
Annual gross expense.....	20,565	20,057
Annual gross expense to provide sinking fund to retire bonds in 25 years at 5 per cent compound interest.....	21,471	20,163
Number buses required.....	2	2
Annual passengers.....	Not estimated	

would be conducted with trackless trolley buses. The chart for Fenkell Avenue is reproduced. However, the interested associations named have not yet come to a decision as to trackless or gasoline bus as that is partially dependent on the ultimate routes and these in turn are dependent to some degree on the character of paving.

EXTENSIONS TO BE FINANCED ON SERVICE-AT-COST BASIS

It is obvious that the Department of Street Railways cannot undertake to finance and build immediately the large number of extensions desired, more particularly those developments which are being pushed by real estate interests in advance of normal, contiguous growth. For this reason the management has gone on record to the effect that a portion of the pioneering losses should be borne by those who will benefit from the enhancement of property values. The College Park and Grand River Associations have shown a disposition to agree with this idea.

The policy of the D. S. R. in having those most interested in extensions into new territory help pioneer the cost both of construction and operation is very ably seconded in the speeches made by Ezra B. Whitman, chairman of the Public Utilities Commission of Maryland, and L. F. Eppich, past-president National Association of Real Estate Boards, respectively, at the last A. E. R. A. convention. (Pages 596 and 628 of ELECTRIC RAILWAY JOURNAL for Oct. 11, 1924.)

TRAFFIC SURVEY—NORTHWESTERN DISTRICT

Date 192

Name Address
Near

Number of adults in residence

Number of children in residence

Number of present daily riders Time per day

Lines used at present

Number who would use line on Seven Mile Road, Redford to Woodward Avenue

Number who would use line on Fenkell, Grand River to Livernois

Is traveling to and from Detroit at present, what facilities are used?
(D.S.R.—D.U.R.—Bus—Private Car)

Representative



Form of Questionnaire Submitted to Residents in Suburban Areas, Showing Street Plan



This Philadelphia & Western Car Is Divided Into Two Compartments. Center Doors Without Steps Are Provided

Light-Weight Interurban Car Has Cabinet Control

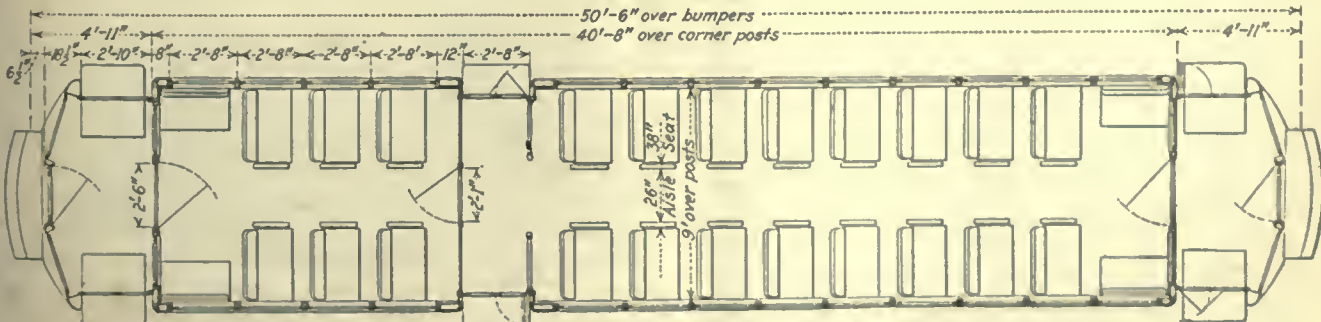
A Sample Car Being Tried Out on the Philadelphia & Western Weighs 57,000 Lb. and Seats 56 Passengers—Center Doors Without Steps Are Used at Flush Platforms—Automatic Control Equipment Is Designed to Operate in Trains with Other Control

A LIGHT-WEIGHT car with all-steel body has recently been placed in interurban service by the Philadelphia & Western Railway between Philadelphia and Norristown, Pa. The car is 50 ft. 6 in. over the bumpers and 40 ft. 8 in. over corner posts. The interior is divided into two compartments at a small vestibule with side doors for entrance and exit, in addition to the end doors. These side doors are used at stations provided with flush platforms, which are installed at most of the stations on the road. Cross seats 36 in. wide are used throughout except for four longitudinal two-passenger seats at the ends of the car. A width over posts of 9 ft. gives an aisle width of 26 in. The main passenger section seats 38 and the smoking compartment 18, making a total of 56. The seats are upholstered in cane. The car was built by the J. G. Brill Company, Philadelphia, and Brill light-weight trucks are used. The car is propelled by four Westinghouse 535-B 60-hp. field-control motors.

All doors are of the folding type, opening outward and operated by National Pneumatic door engines, controlled by individual air valves located adjacent to the door. The car is heated by Consolidated Car Heating Company cross-seat heaters with thermostatic control. The interior is lighted by a single row of lamps down the center of the car, with two lamps at the side doors, one on either side of the aisle. The center lamps are of 72-watt size, while the two door lamps are 36 watts. The lighting fixtures are Electric Service Supplies compensated type, with shades. Details of the equipment and construction of the cars are given in the table on page 134.

CABINET TYPE CONTROL HAS NEW FEATURES

The importance of having the control equipment readily accessible, dry, clean, warm and relatively safe at all times led to the choice of Westinghouse double-end, electro-pneumatic, cabinet-type equipment. All but



A High Floor Car with Both End Platform and Center Doors

four pieces of the control equipment are mounted on a panelboard in a fireproof cabinet at the end of the car, with doors opening from the platform. These four parts, which are hung from the car underframe, are the fuse box, main grid resistor, controller resistor, and line switch. The parts of the equipment mounted on the panelboard include the electro-pneumatic unit switches, main and auxiliary knife switches, overload trip relay, reverser, motor cut-out switch and control cut-out switch. The panelboard equipment is mounted on a steel framework inclosed in an asbestos-lined metal cabinet, which extends from the floor to the canopy.



The Interior Is Divided to Provide a Smoking Compartment

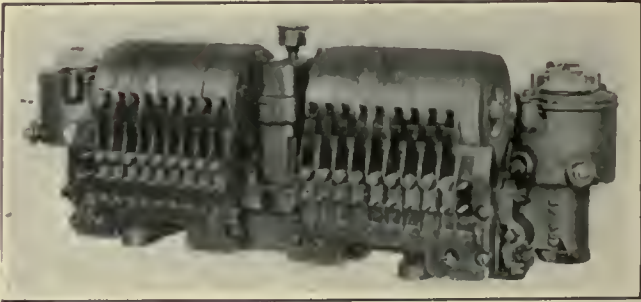
EQUIPMENT AND DIMENSIONS OF PHILADELPHIA & WESTERN INTERURBAN CAR		
Number of cars ordered.....	One (sample)	
Date of delivery	Oct. 27, 1924	
Builder of car body.....	Brill	
Type of car	Closed interurban passenger	
Seating capacity	56	
Total weight	57,000 lb.	
Booster centers, length.....	30 ft. 6 in.	
Length over all	50 ft. 6 in.	
Truck wheelbase	6 ft.	
Width over all	9 ft. 1 in.	
Height, rail to trolley base.....	14 ft. 6 in.	
Body	All steel	
Interior trim	Mahogany	
Roof	Arch	
Air brakes	Westinghouse	
Axles	Standard, heat-treated	
Car signal system	Faraday buzzer	
Control	Westinghouse AL	
Couplers	Tomlinson, Form 8	
Curtain fixtures	Curtain Supply	
Destination signs	Wood blocks, P. & W. Ry. Standard	
Door-operating mechanism.....	National Pneumatic	
Energy-saving device	Economy watt-hour meter	
Gears and pinions	Nuttall	
Hand brakes	Consolidated	
Heater equipment	Imperial	
Headlights	Brass, 4 1/2 x 8 in.	
Journal bearings	Westinghouse type M-F	
Lightning arresters	Four Westinghouse 535-B, inside hung	
Motors	Murphy	
Paint and enamel.....	Ohmer	
Registers	Westinghouse	
Seats	Nuttall	
Slack adjuster	Brill	
Trolley base	Brill	
Trucks	Davis, 30 in.	
Ventilators		
Wheels		

Additional control details required for automatic acceleration are separately mounted in a box on the bulkhead over the door, including the limit relay, sequence drum, and operating relays.

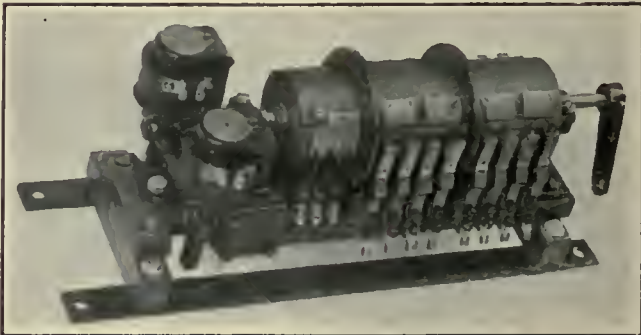
The circuit arrangement for the control embodies the usual Westinghouse type AL control scheme as illustrated in the accompanying diagram. The control is so arranged that this car can be operated in trains with cars equipped with two other types of control used by this company. The master controller has one switching and two running positions. The first position of the controller serves to bring in the LS, R1 and S switches, connecting the pairs of motors in series with the main resistor directly across the trolley. This position is used for coupling and slow operation of cars. The second position of the controller permits the sequence drum to advance to the full series position under control of the limit relay, while the fourth and last position allows the sequence drum to advance to full parallel with short field connection of the motors. The operator may choose at will the position of the master controller, and the sequence drum will advance to the corresponding position. Notch by notch acceleration may also be obtained by oscillating the master controller drum between the first and second positions or the third and fourth positions, each oscillation serving to advance the sequence drum one notch.

A protective feature has been added through the interlocking scheme in the circuit to the LS switch coil. Loss of power such as is caused by gaps in the third

rail or the tripping of the overload trip relay causes the switches to open. Power cannot again be applied to the motors excepting by repeating the regular notching-up process. This circuit contains two interlock contacts. One contact is carried on the sequence drum and closes the circuit to the LS switch coil on the first position only. The second contact is carried on the moving element of the LS switch itself and shunts the first contact when the switch is closed. The contact on the drum closes the circuit to the coil and causes the switch to close, at which time the contact on the switch closes the shunt circuit, and continues to hold the switch closed while the drum advances to succeeding positions. In this manner the LS switch maintains its own operating coil circuit. Should the switch open for any reason, it cannot be closed again until the drum is in its original position. This feature eliminates motor flashing, prevents the tripping of heavily loaded and sensitive substation circuit breakers and maintains smooth, reliable and safe operation.



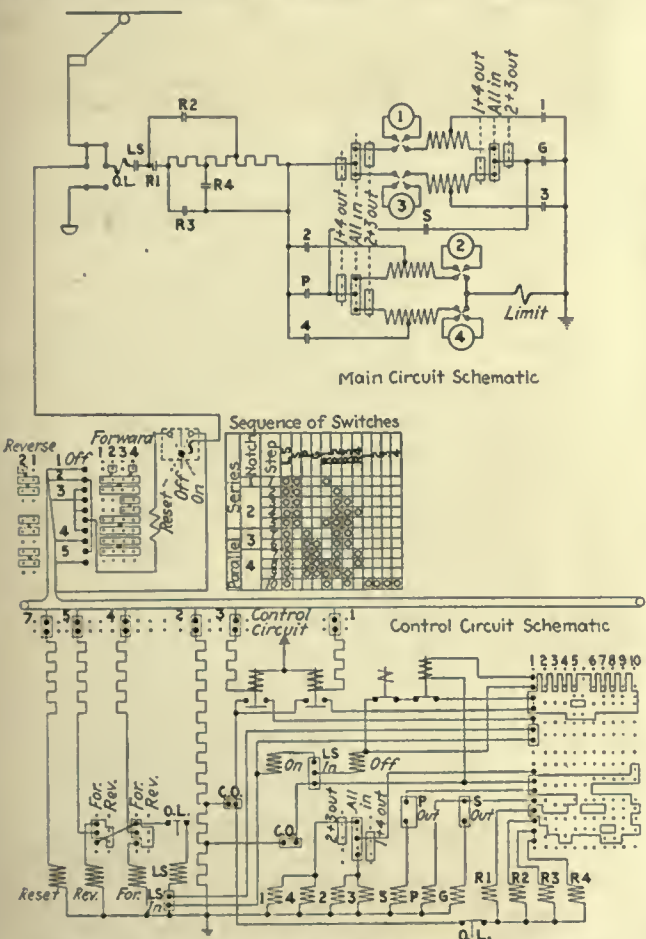
The Sequence Drum Replaces the Older Type of Interlocks to Give Automatic Acceleration of the Motors



The Air-Operated Reverser Is Arranged for Emergency Hand Operation

The main and auxiliary switches are mounted on a common base centrally in the cabinet. These switches are of the single-pole, double-throw, knife-blade type and are used to transfer the respective circuits to either third rail or overhead trolley. Above and to either side of these switches are mounted eight electro-pneumatic unit switches, while below are mounted the control cut-out, overload trip relay, reverser and motor cutout drum. The details are front connected, permitting ready access for inspection and maintenance.

The 10 switches are self-contained units with individual blow-out coils, being identical and interchangeable. Two of the switches are assembled in a sheet steel box



Control Circuits Are Arranged for Automatic Acceleration

and are hung from the car underframe. These two switches are used to take care of short circuits and overloads.

The lower contact of the switch is the moving element and is mounted by means of an insulator directly upon the piston rod. A heavy spring surrounds the piston rod and forces the piston down with a pressure of approximately 100 lb. The normal operating air pressure is 70 lb. per square inch, which gives a gross upward pressure of about 210 lb. so that a net pressure of about 100 lb. is obtained at the switch jaw. The stationary upper contact is shielded within an arc chute held between the pole pieces of the blow-out coils.

Protection from overloads and short circuits is provided by means of an overload trip relay, with a series coil in the main motor circuit. The coil actuates an armature which strikes and lifts a vertical shaft carrying the interlocks in the circuits of the unit switch magnet coils. This breaks the circuit and opens the switches. The relay is returned to normal or reset

position by means of a reset coil which trips the armature from the locked position.

The reverser and the motor cutout switch are very similar. The reverser is normally electro-pneumatically operated but may be operated manually, whereas the cutout is manually operated only. Fingers carrying motor current are mounted upon an insulating base and rest upon copper contacts carried upon a drum which is moved by the magnet valve or handle, as the case may be. The circuit to the magnet coils of certain of the unit switches is brought to fingers and contacts on the reverser for interlocking to insure against moving the reverser while power is being applied to the motors. Similar interlocking is accomplished on the cutout to prevent closing the short field unit switches when the corresponding motors are inoperative.

Automatic acceleration of the motors is accomplished by means of a sequence drum, governed by a limit relay. The drum has a definite rate of rotation giving a constant rate of acceleration. It is operated by two opposed magnet valves and cylinders connected by a rack engaging with a pinion carried on the drum shaft. Energizing the "on" magnet opens the inlet valve to its cylinder; energizing the "off" magnet opens the exhaust part of its cylinder. De-energizing causes the reverse operation. Consequently energizing both magnets causes the drum to advance in one direction, whereas de-energizing both magnets causes the drum to rotate in a reverse direction. Energizing one and de-energizing the other stops progress of the drum in either direction.

The limit relay used to govern the rate of advance of the sequence drum comprises a series coil in the main motor circuit whose armature carries a contact in the circuit of the "off" magnet of the sequence drum. When the motor current exceeds a predetermined value, the armature is actuated, lifting the contact and breaking the circuit to the "off" magnet of the sequence drum and thereby arresting further advance of the drum until the motor current drops to the proper value.

The train line circuits carry trolley potential, whereas the control apparatus operates at approximately one-fourth trolley voltage or less. To keep the high voltage out of the control apparatus, operating relays are provided. These are connected to the respective train-line circuits and when energized close the respective low-voltage control circuits. One relay controls the circuit that causes the sequence drum to progress to full series or full parallel, whereas the other relay causes the drum to advance through transition of motor circuit connections. The low-voltage control circuits are energized from the control resistor, which is of the heater type and is mounted under the car.

Altoona Trainmen Have Voluntary Relief Association

THE employees of the Altoona & Logan Valley Electric Railway, Altoona, Pa., have organized a voluntary relief association. The dues are \$1 per month. Accident and sick benefits are paid at the rate of \$1 per day. In case of the death of an employee his family receives \$200. In case of the death of the wife of an employee, the latter receives \$100. At the same time all employees are insured under the Metropolitan group insurance plan. The railway pays the premiums to the extent of \$500 for each employee, who has the privilege of taking out \$500 more on his own account.

Continuous Transit Proposed for Atlanta

Underground Moving Sidewalks in the Business District Are Suggested in Beeler Report as the Most Economical Method of Relieving Sidewalk Congestion—New Viaducts and Double-Deck Streets Are Other Improvements Recommended

UNTIL recently Atlanta had no city plan. The wholesale, packing and manufacturing districts closely adjoin the shopping district, and the heavy teaming, trucking, light vehicular traffic and street cars mingle promiscuously to the detriment of all. The streets are narrow, comprising only 33 per cent of the business area. Many are not through streets, branching off from Peachtree, the main street, first on one side and then the other, herringbone fashion. This arrangement is responsible for a multiplicity of turning movements, resulting in traffic congestion and consequent delay.

To remedy some of the deficiencies a city plan was adopted in 1922. A traffic plan following this scheme, but containing certain additional features made desirable by more recent developments, has been prepared by the Beeler Organization, New York, and presented to the city. A number of features of this report were described in ELECTRIC RAILWAY JOURNAL for Jan. 10. Others are outlined below.

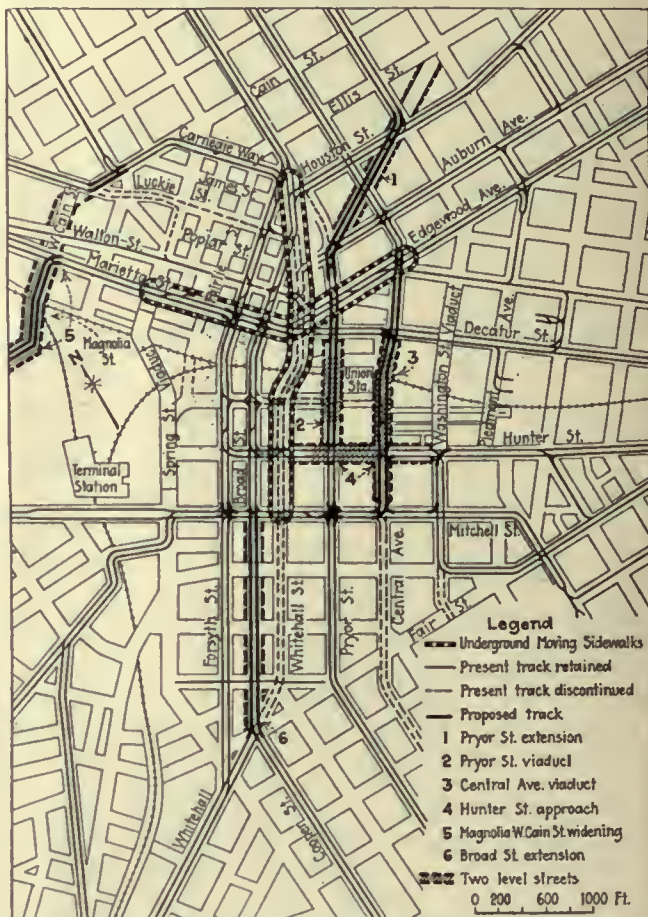
Concentration of traffic in the small area of the central business district has resulted in the slowing down of all vehicular and street car movements. During the evening rush hour automobiles, taxicabs, buses and jitneys choke the main thoroughfares. The cars are slowed down to little better than a walk and pedestrians jostle each other to the limit of the sidewalks and crowd the street intersections. The pedestrian far outranks all the rest both in numbers and importance, according to the Beeler report. A check showed that 14,658 pedestrians passed Five Points, the intersection of Marietta, Decatur, Peachtree Streets and Edgewood Avenue, during the rush hour and there were only 8,785 riders in vehicles of all sorts.

New and enlarged transportation lanes for the vehicles and additional transit facilities for the pedestrians are needed. By rerouting the cars, widening streets, cutting new streets, building viaducts and an underground moving sidewalk, traffic will be diffused and equalized throughout the congested area. A revised plan for the business district as recommended in the report is shown in an accompanying illustration. The seven principal north and south streets will then cross overhead the steam railroad tracks which bisect the business district. Three arteries will be given over solely to vehicular traffic and four others will care for the street railway and general traffic. Double-decked streets are also recommended.

UNDERGROUND MOVING SIDEWALK PROPOSED

It is proposed that a system of continuous sub-surface transit be installed. Two sections are recommended, one on Peachtree-Whitehall Streets from Mitchell to Carnegie Way, a distance of 2,960 ft.; the other on Marietta-Edgewood Streets between Spring and Ivy, a distance of 2,300 ft. The total length of the system would be 5,260 ft.

This method of handling local transportation is favored in the report because of the density of pedestrian traffic. It would consist of three parallel continu-



Proposals of the Beeler Report to Relieve Traffic Congestion in the Business District of Atlanta, Including Street Openings and Viaducts, Two Sub-Surface Moving Sidewalks and New Car Tracks

ous platforms directly beneath the surface sidewalk, operating endless chain fashion, up one side of the street and down the other, looping back at the terminals. The speeds proposed for the first, second and third platforms are 2, 4 and 6 m.p.h., respectively. A stationary walk 30 in. wide inside the low speed platform would permit access at any place along the line.

According to the plan the first and second platforms would each be 27 in. wide. The outside platform would be 57 in. wide and would be provided with seats spaced 32 in. from center to center, each accommodating two passengers. The total width of the three platforms assembled would be 9 ft. 3 in. and the height of the platform above the rail would be less than 12 in. The second and third platforms would overlap the adjoining platforms about 1 in.

Each walk would be made up of a series of small trucks about 8 ft. long with radial ends fitting exactly into each other. Each truck would have at one end two independent wheels on ball bearings and at the other end rest on the preceding truck through a universal coupling. Compressed sheet metal covered with anti-slip mastic would be used for the floors.

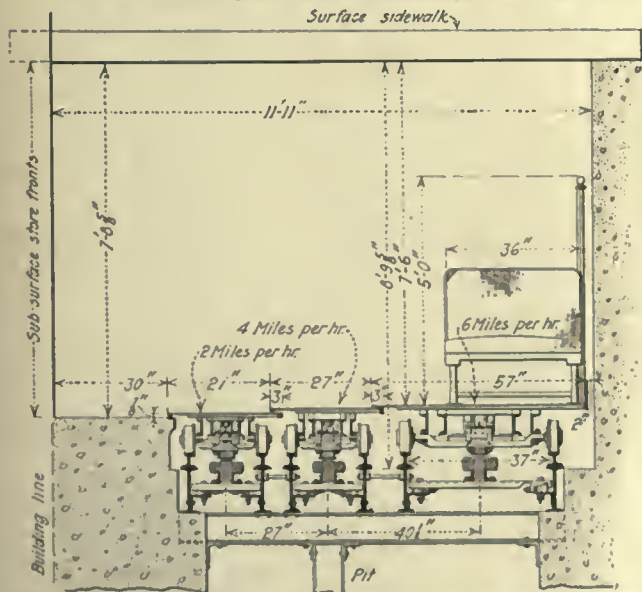
Either of two methods of propulsion may be employed, induction drive or racks and pinions. In the first instance, a secondary element similar to the short-circuited winding of an induction motor, made in straight sections 8 ft. long, would be placed on the under side of the trucks forming the platforms. The stationary or primary elements of the motor would be in sections 5 ft. long and placed between the rails in groups about 140 ft. apart with an air gap of $\frac{1}{4}$ in. between the primary and secondary. Both elements would be adjustable so as to preserve the air gap. Three-phase alternating current with a frequency of 37.5 cycles per second would be used to drive the high-speed platform. The 2-mile and 4-mile platforms would be driven in this manner with the identical construction, but with the frequency reduced to 12.5 and 25 cycles, respectively. (This system was described in *ELECTRIC RAILWAY JOURNAL* for Nov. 24, 1923, page 899.—ED.)

With the rack-and-pinion method, the racks would be continuous and mounted on the under sides of the platforms in the same manner as the secondary element in the induction drive. The driving units would be placed at intervals of from 1,000 to 1,500 ft. The induction drive method is thought to be the more simple, satisfactory and efficient.

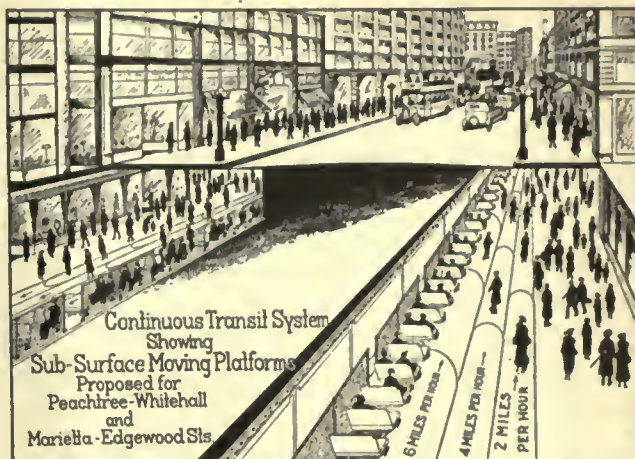
In operation, the passenger boarding the moving platform would step from the stationary walk or station to the first platform, which would travel at 2 m.p.h.; then to the second, traveling at 4 m.p.h., and finally to the third, traveling at 6 m.p.h. Here he would take a seat and be transported nearly twice as fast as he could walk. In alighting, the reverse order of stepping from one platform to the next would be followed.

In the event that a higher rate of speed is later found advisable this could be increased to 2.5, 5 and 7.5 m.p.h., or even 3, 6 and 9 m.p.h. Considering the comparatively short distances involved in the Atlanta plan, speeds of 2, 4 and 6 m.p.h. are thought to be satisfactory. Every fourth unit, comprising three double seats, might be especially designated for the use of the colored population. These seats might be enameled a brilliant blue, while the other seats are buff or orange, so that the two classes could be distinguished readily.

Such a moving platform, including the stationary



Cross-Section of the Moving Sidewalk Recommended as a Means of Relieving Sidewalk Congestion



The Appearance of the Proposed Continuous Transit System

walk, requires a clear space 12 ft. wide and 9 ft. high, including the rails. Entrance stairways would be constructed on both sides of every street intersection and basement entrances from important stores and buildings at intermediate points. With the stationary walk, a continuous station would be provided the entire length of the line, permitting the stores to improve their basements and make a continuous arcade. The general arrangement proposed and a cross-section are shown in accompanying drawings.

In case of an interruption in the service from any cause, the speed of the platforms can be controlled automatically. Should a platform be disabled from any cause it can be stopped and the other platforms continued in operation at a reduced speed. In the event that all movement is stopped, there will always be a continuous open walk 9 ft. wide, well lighted, well ventilated and with exits to the street above every 200 to 300 ft.

The installation requires an excavation but slightly in excess of 250 sq.ft. in cross-section, as compared with 1,000 sq.ft. in four-track subway construction, and the cost will be proportionately less, as the interference with sub-surface structures is minimized.

The total weight of the rolling stock equipment per seated passenger is 350 lb. as compared with 1,500 lb. in subway operation, and the total tractive resistance per ton is less than one-half of that in the latter operation. The seated capacity at the 2, 4 and 6 m.p.h. rate would be 23,600 passengers per hour each way, the report states.

The first cost of equipment complete, including tunnels, is estimated to be about one-fifth of the cost of a four-track subway equipped, and the operating cost is about one-sixth as much for equivalent service.

Advantages claimed for this system of continuous transit are that it will afford relief to the present street traffic congestion, will more than double the present sidewalk area of the streets affected, will transport pedestrians 100 per cent faster, without exertion, and will distribute passengers from the various transportation arteries to practically all parts of the business district. It will afford the merchants and stores along its route double display space with show windows on both the street above and the moving walk below.

MOVING WALK WOULD AVOID PARKING

Parking of cars can be virtually eliminated from the streets of the entire central district. In fact, it will be unnecessary to enter the more congested parts of the business district with the automobile, the report says,

because the owners may park their cars outside of the business district, step to the nearest entrance of the moving platform and be quickly transported to within easy reach of any part of the central district. Garages of huge proportions could be located near the platform terminals on the north, south, east and west sides, where cars can be parked and otherwise cared for at a nominal expense. It is recommended that this system be built by the municipality and the service furnished free to the public. The estimated cost of the installation is \$3,000,000.

DEVELOPMENT OF CLOSE-IN TERRITORY

Many beautiful suburbs have been developed in the territory contiguous to Atlanta. In fact, the growth has been faster outside of the city than within. This development is a large factor in Atlanta's prosperity, but, being scattered, is rather costly to the community as a whole. With communities moving out from the business center the expense of supplying them with modern conveniences increases. Longer electric light and telephone lines, more gas mains and more street car tracks are needed with a scattered than with a compact community. This is reflected in the increased operating expenses, which must be paid for by the public with the service charges. The effect of this can be seen from the average distance the railway carries its pay passengers, 3.40 miles, which is unusually long for a city of this size.

According to the report, however, there is close-in territory practically undeveloped. Some would require extensive grading, while other sections could be developed at very little expense. It is urged that the city institute a campaign for the development of close-in territory. This development can be encouraged by the improvements recommended.

To remedy present conditions and properly care for future expansion, a number of important civic improvements, including street openings, viaducts and other improvements, are necessary. The steam railroads between Decatur and Hunter Streets bisect the business district, as shown on the accompanying map. Of the seven principal thoroughfares connecting the two parts, the two outer ones, Spring and Washington Streets, are carried over the railroads on viaducts. Forsyth, Broad and Peachtree Streets cross overhead on bridges, while Pryor Street and Central Avenue cross the tracks at the surface. During the rush hours the Peachtree, Broad and Forsyth Streets bridges are so badly congested that the overflow is forced to use the grade crossings. More than 500 vehicles per hour cross these busy tracks at either end of the Union Station during the period of maximum traffic.

Two viaducts are recommended, as follows: On Pryor Street, commencing at Decatur Street and extending to Hunter Street, and on Central Avenue, commencing at Decatur Street and extending to Mitchell Street. By extending the latter to Mitchell Street, ample headroom will be provided for all the roadways of the Atlanta joint freight terminal. The heavy hauling to and from these terminals and the produce house district on Alabama Street will be conducted on the street level, where it will not interfere with the faster movements of the lighter traffic overhead.

STREET OPENINGS AND WIDENINGS

One of the most detrimental features of the layout of the business district is that the principal thoroughfares end blindly or converge. At the present time the city

has arranged for, or is considering, several needed street improvements, notably the widening of Peters Street and the opening of Madison Street into Whitehall. A number of other projects, however, are recommended in the report. Broad Street should be opened from Mitchell through to Cooper and Whitehall and Pryor Street should be extended from the intersection of Auburn, swinging to the east, and giving a connection with Ivy Street, Courtland Street and Piedmont Avenue. Magnolia and Cain Streets should be widened between Davis and Luckie Streets.

The cost of street opening and widening projects considered in the report is estimated at about \$2,500,000. Construction of viaducts will necessitate an additional expenditure of approximately \$2,000,000. The expense of street widening and opening should be divided into two equal parts, the report recommends, one part to be assessed against the property benefited and the other to be paid for by the city at large. The cost of building viaducts should be divided into four parts, the steam railroads, the street railway, the property benefited and the city at large paying equally.

The recommended street openings and new viaducts will enable the Georgia Railway & Power Company greatly to improve the car routes in the downtown district. Among the important changes of this kind recommended in the report are the discontinuance of track on Peachtree and Whitehall Streets between Cooper Street and Luckie Street and the construction of new track on the extension of Broad Street between Mitchell Street and Whitehall Street. Details of the proposed changes in car routes will be given in an article which will appear in a future issue of this paper.

More Evidence of the Merchandising Value of New Equipment

WITH the close of 1924, the Indianapolis & Cincinnati Traction Company completed 6 months operation with its new rolling stock, the system having been changed from a.c. to d.c. operation and the new cars placed in service on July 1. In the month of June just prior to the change, this company showed a 15 per cent loss in number of passengers as compared with June, 1923. Similarly, for that month and for the 6 months to the end of the year, the other interurban companies using the Indianapolis terminal, exclusive of the Interstate Public Service Company, which also operates new cars, have had a traffic running from 15 to 21 per cent less than for the corresponding months of 1923. But the new cars on the Indianapolis & Cincinnati lines attracted patrons to the extent that for July, August, October, November and December the number of passengers was just about even with, slightly above or below, the number for the corresponding months of 1923, and for September was 6 per cent above.

An interesting sidelight on the number of passengers in September was that during the State Fair held in this month the I. & C. offered a round-trip ride for 80 per cent of the one-way fare and took in more money than the year before with the old equipment and a round-trip fare of 1½ times the one-way fare.

As a further effort to advertise the new equipment, a \$1 round-trip fare to and from any point on the line has been in effect for 24 Sundays. Without exception the revenue taken in on each Sunday has been more than was taken in on the corresponding day for the year before.

Trolley Arrangement on Bascule Bridge

Bar Construction Is Replaced with Trolley Wire on Lift Bridge of the Galveston-Houston Electric Railway—Hinged Connections and Flexible Suspension Among Improvements

BY C. L. GREER

Galveston-Houston Electric Railway, Houston, Tex.

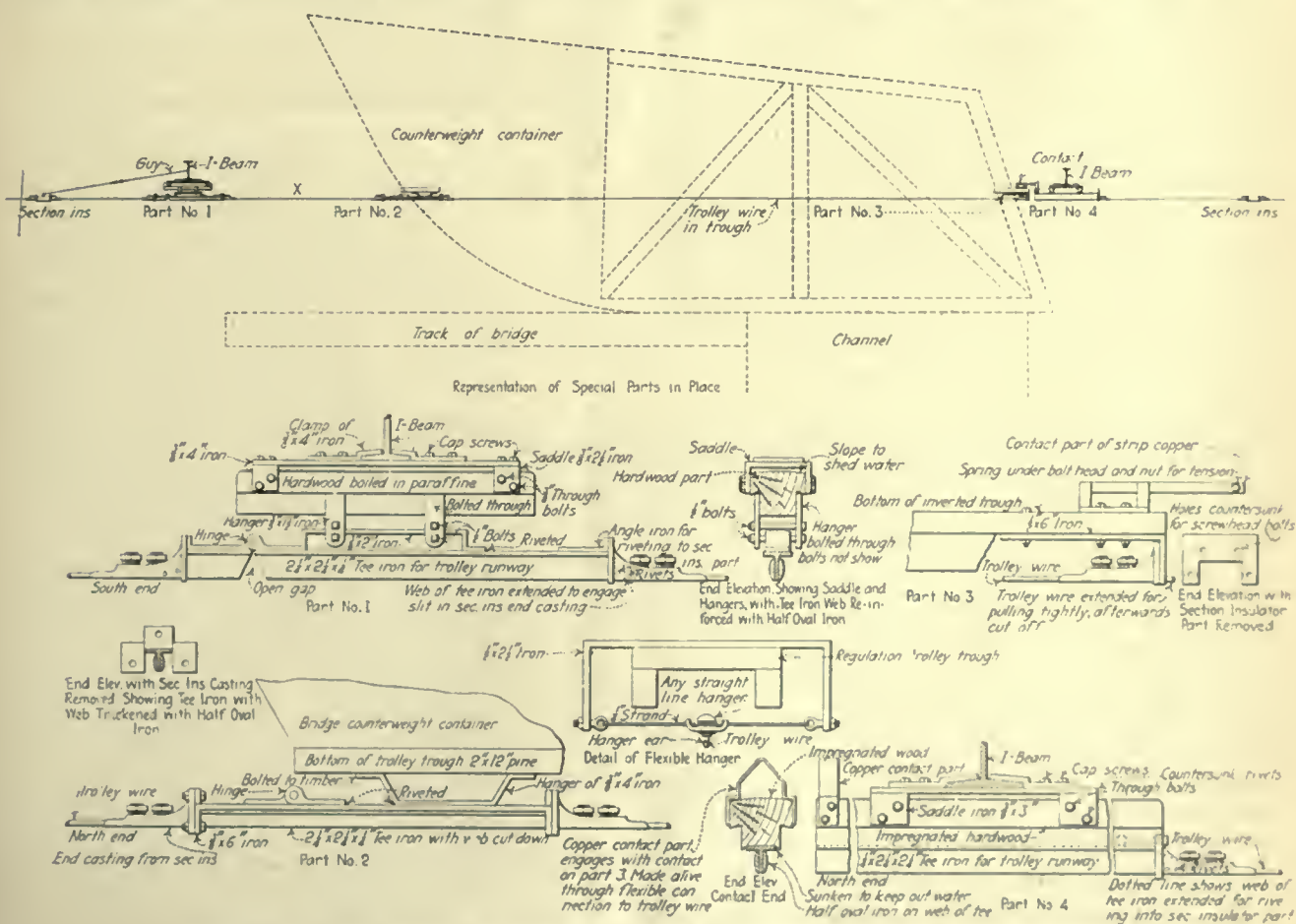
THE problem of providing a satisfactory trolley wire arrangement on a bascule bridge of the Galveston-Houston Electric Railway has been a perplexing one for 12 years. A satisfactory arrangement has now been obtained, and is shown in the accompanying illustration.

Before the present construction was adopted, the trolley runway over this bridge consisted of two steel angles placed together so as to form a "T," and fastened to the under side of a trolley trough. The section which slacks back as the bridge is lifted was formed of a flexible wire rope, which had a system of weights and pulleys to take up the slack as the bridge raised. This arrangement was unsatisfactory, as the wire rope wore out rapidly and serious difficulty was experienced from the trolley wheels leaving the runway.

The construction illustrated has now been substituted. Considering the parts as they appear from left to right in the accompanying illustration, the first is a section insulator, which separates the trolley runway on the bridge from the line to the left, so that the section of trolley on the bridge is fed from the right end. This

section insulator is connected to Part 1 by standard No. 0000 grooved trolley wire. The end castings of Part 1 are made from standard section insulators. The center part is made to form a hinge and is supported from one of the I-beams of the bridge by a saddle fastened to a hardwood insulator. The top of this wooden section is sloped so as to shed water readily, and the lower part is formed to take two hangers from which a $\frac{3}{4}$ -in. x 2-in. iron is supported. This in turn supports a 2 $\frac{1}{2}$ -in. x 2 $\frac{1}{2}$ -in. x $\frac{1}{4}$ -in. T-iron, used as the trolley runway. The sides of this iron are reinforced with $\frac{1}{2}$ -in. oval iron. The part between 1 and 2 slacks back as the bridge is lifted, and in the latest construction consists of No. 0000 grooved trolley wire, the same as the remainder of the line. In the first construction used, $\frac{3}{4}$ -in. galvanized messenger wire was tried. As it is sometimes necessary for cars to stop and start on the bridge, heavy currents are drawn, and the galvanized wire proved unsatisfactory. The hinged arrangement of Part 1 allows this section of the trolley to drop as the bridge is lifted.

At the left-hand end of the bridge counterweight container another hinge construction is used. This is shown as Part 2 and is quite similar to that of Part 1. The end castings used are from standard section insulators. Parts 3 and 4 are arranged to break the contact as the bridge lifts. No. 3 supports the end of the trolley wire and has a contact piece of strip copper at the top. Part 4 has contact jaws to form the other part of the switch, which breaks as the bridge opens. The section insulator shown at the right has a jumper around it, with a disconnecting switch. The bridge trolley wire is fed through this jumper.



Construction Used for Trolley Wire on Bascule Bridge of the Galveston-Houston Electric Railway

Slacking back of the line trolley is prevented by guys which run from the section insulator at the left-hand end of the bridge to the I-beam, to which Part 1 is clamped. When the bridge is down, the guys are slightly slack, and the section between Parts 1 and 2 takes the full trolley strain, but as the bridge rises, the guys are pulled taut so as to take the entire trolley strain.

The section insulator at the left end also has a jumper with a switch, which is normally kept open and is used only in case it is necessary to energize the trolley wire on the bridge from the left end.

A detailed sketch is also given of the special hanger for the trolley wire used along the trough. This type of hanger is very flexible and much better than the stiff barn hanger commonly used in such locations. It also eliminates the hammer blow which usually takes place with this type of construction.

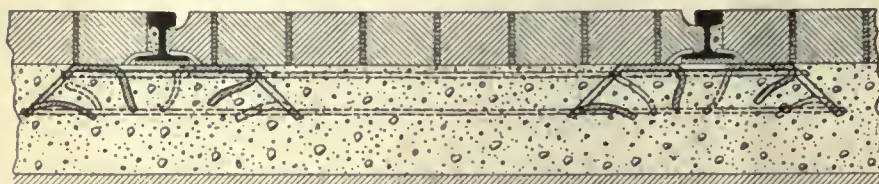
Cushion Tires Tried at Cleveland

Experiments Are Being Made with a Track Structure Which Provides Unusually Wide Support for the Rails—An Asbestos-Asphalt Cushion Is Expected to Have an Important Effect in the Elimination of Noise

A NEW type of substitute tie designed by Charles H. Clark, engineer maintenance of way Cleveland Railway, and Chester F. Gailor, consulting engineer, is being tried in Cleveland. This differs from the ordinary type in that it has a greater width of support for the rail. Contrary to usual practice the rail supports are not continuous from one rail to the other, but are provided for each rail individually and connected only by tie rods.

Each of the supports is made from flat sheet steel formed into a trapezoidal channel or chamber open at the bottom. At suitable points tongues of metal are punched out and bent inward to project into the chamber. Other portions in the form of lugs or clips are punched out and bent outward or upward extending lengthwise of the track and being arranged to project over the two edges of the rail base. There are four of these to each support.

The chamber is then filled with concrete, which is

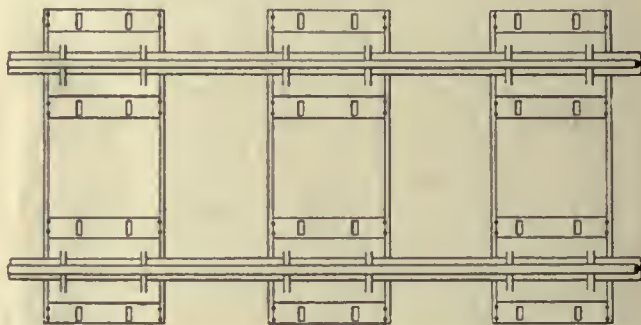


Type of Track Construction Being Tried in Cleveland with Asbestos-Asphalt Cushions Under the Rails

done in the yard of the track department or at any other suitable place before the supports are taken to the job. The pouring is done while the support is in an inverted position held by a suitable frame. This frame has end walls to close the open ends of the chamber and thus hold the concrete. The tongues or inward projections form steel reinforcing members. It is thought that pouring the concrete with the side walls of the chamber converging downward will insure that the mass of concrete will be homogeneous and that a good connection between the concrete and the metal will be obtained.

Rail holding clips take the place of spikes or similar rail fastenings. To fasten the rails after they have been placed on these metal supports the clips are hammered down until they are in firm contact with the rail base. As this sometimes proves difficult in practice, small wedges are driven between the upper surface of the rail base and the lower surface of the clips. These are then welded to the rail.

The rail base rests on an interposed flat strip of asbestos-asphalt or other suitable material, which forms a cushion of the same width as the rail base and as long as the top member. In this way a damping effect is obtained which it is thought will eliminate most of the noise now common to street railway track structures in paved streets.



The Unusual Spread of the Rail Supports Gives This Track Greater Stability than Is the Case with Ordinary Ties

In order to maintain the proper gage, tie rods have been welded at top and bottom of the supports. These rods are then imbedded in the concrete base in which the rail supports are placed, thus forming a continuous solid mass. This also acts as reinforcement for the concrete. The upper surface of the base concrete is made flush with or slightly above the upper surfaces of the steel supports.

A cross section of the track structure is shown in an accompanying illustration. The paving blocks are grouted at the joints and the heads and webs of the rail are likewise imbedded in grout. In this way a monolithic structure is obtained. Notwithstanding the rigidity of the mass, the track is said to be practically noiseless on account of the cushions under the rail. This design provides considerably greater support for the rails than is now ordinarily furnished, the ties covering about half of the linear dimension, while the central portion of the tie, which is of no great value in monolithic construction, is eliminated.

The work of placing supports of this type can be done with the simplest track tools. The supports are comparatively light and therefore easily handled, the expense of

handling and shipping them being correspondingly low. As the support is made in one piece with the rail fastening it is impossible for the parts to work loose or become unserviceable on account of rusting of the threads as sometimes happens when screws and nuts are used. It is claimed that owing to the greater area of support it is possible to use a lighter rail section without impairing the stability or the lasting qualities of the track and roadbed. Should it be desired to do so, this type of rail support can be made continuous from one rail to the other, instead of being made in two pieces connected by tie rods.

Oldest London Tube Reopened

After Extensive Changes Taking Two Years, Including Enlargement of the Tunnel and Modernization of the Stations and Rolling Stock, the City Railway Has Inaugurated Through Service with Other London Underground Lines



Exterior of the Stockwell Station on the City & South London Railway. This Is One of the Reconstructed Stations

THE City & South London Railway of London, England, which has been closed in parts for about 2 years during the work of enlarging its tubular tunnels, was reopened for traffic on Dec. 1, 1924, throughout its entire length of more than 7 miles. At the same time joint services were established with the Charing Cross & Hampstead Railway via the new junction between the two lines at Chalk Farm, through trains being run from the City & South London line to Highgate on one branch and to Hampstead and Edgware on the other.

The original section of the City & South London Railway, some 3 miles long, from King William Street in the City of London to Stockwell in South London, was the first underground electric railway in the world. It was opened for public service in December, 1890. Various extensions were made from time to time, both to the south and to the north, until the railway extended from Clapham to Euston, giving interchange stations with the main-line termini from the north. A further extension, some 5 miles long, from Clapham to Morden in Surrey, is now under construction.

Down to the time of the reconstruction now com-

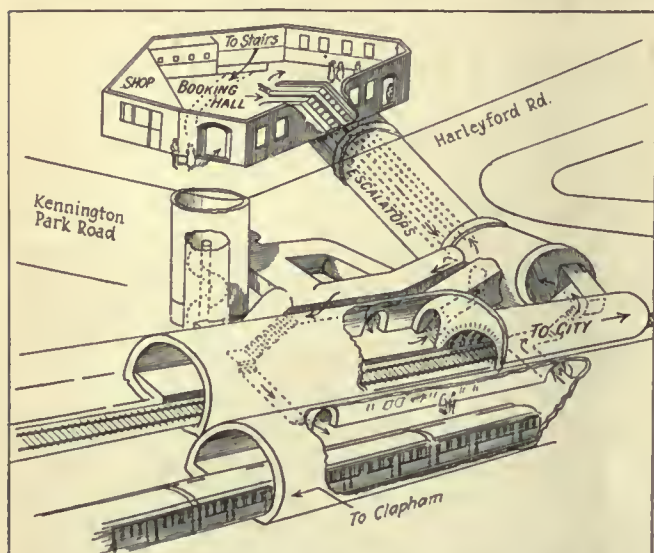
pleted the tunnels were of only from 10 ft. to 10 ft. 6 in. diameter, with an 11-ft. 6-in. bore for a short distance. The cars accordingly were far from roomy, and they were hauled by small electric locomotives. Power was furnished by 500-volt, direct-current dynamos, and a third rail conductor was used. As the railway was extended, the three-wire system, and ultimately a five-wire system giving a pressure of 2,000 volts between the outers, was adopted for transmission to the most distant parts of the line. This involved the use of substations for stepping down the pressure.

In 1912 the railway was brought into the combine formed by the Underground Electric Railways Company of London, Ltd. This led to the abolition of the independent City & South London Railway power station at Stockwell, as thenceforward substations of the City & South London Railway were fed by the 11,000-volt, three-phase current from the larger power station built by the Underground company at Chelsea to supply all the associated electric railways in the group.

The management of the various railways then entered on a scheme for extending them in various directions and for linking them together. No through



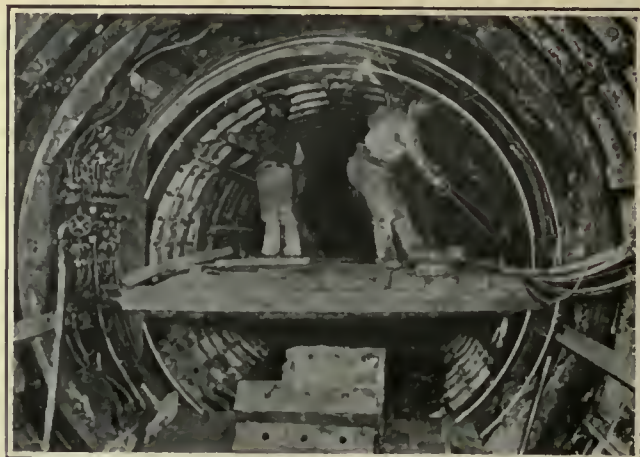
Booking Hall and Escalator Exit on Street Level at Stockwell Station



The Reconstructed Stockwell Station, Showing the Lifts Replaced with Escalators

running, however, could be carried out in the case of the City & South London, as its tunnels were too small to admit of the standard size rolling stock used on the other tube railways. It was decided to enlarge the diameter of the City & South London tunnels to the size of 11 ft. 8½ in. standard on the London Underground lines, and to make a junction with the Charing Cross & Hampstead Railway at Chalk Farm. This is the work which, after 2 years of construction, has now been completed. The electric locomotives have been abolished, the small old cars done away with, and new multiple-unit rolling stock similar to that on the other tube railways, which was described in this paper (issue of Sept. 20, 1924) substituted. The whole construction and equipment, including the passenger stations, have been modernized.

To enlarge the tunnels, the whole of the cast-iron lining segments were removed ring by ring, and as the tunnel was reamed out by the Greathead boring shield the lining was built up again, partly with new seg-



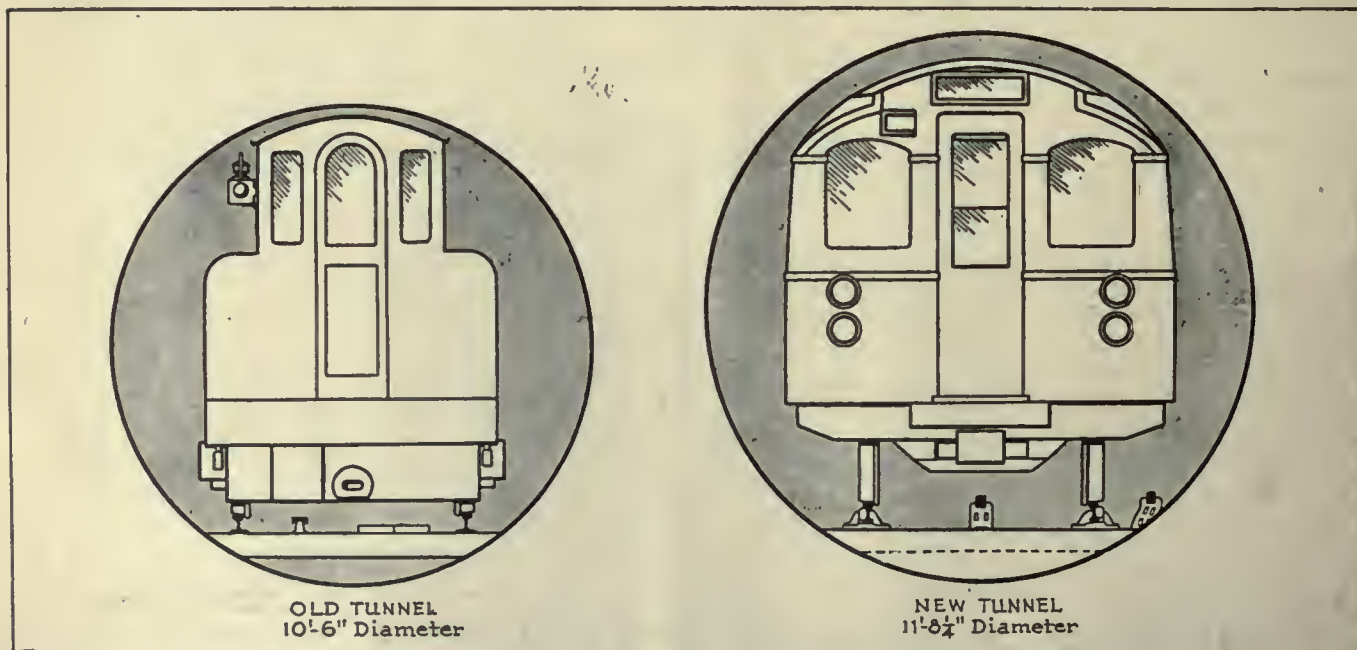
The Tunnel During the Work of Enlargement. The Cast-Iron Segments Were Removed and the Tunneling Carried Out with the Greathead Shield System

ments. On curves the tunnels have been enlarged to from 12 ft. to 15 ft. in diameter. The curves have been smoothed out and the general running conditions improved. The work was one of great difficulty, as during part of the period of reconstruction train services were continued in the daytime. Owing to the infiltration of water, work on some sections had to be carried on under compressed air.

Improvements have been carried out on many of the passenger stations, some of which have now their booking halls under the street level. Escalators in many cases supersede lifts, and everything has been brightened up. New track and new conductor rails have been installed, the running rails consisting of London standard 85-lb. per yard bull-headed section, laid on chairs bolted to wood sleepers. The positive and negative conductor rails are of special high-conductivity steel. The latest system of automatic signaling has been installed.

Train schedules have been speeded up and fares reduced, while through season ticket arrangements have been made with connecting railways and buses.

It was stated by Lord Ashfield, chairman of the Lon-



Sections of the Old and New Tunnels. The Original Tunnel Had a Diameter of 10 Ft. 6 In., While the Reconstructed Tunnel Has a Diameter of 11 Ft. 3½ In.



The City Railway Is Shown on the Map in Its Relation to the Other Portions of the London Underground System

don electric railway companies, at the opening ceremony on Dec. 1, that when extensions are completed the City & South London Railway will have the longest railway tunnel in the world, namely, 14 miles. He also mentioned that the various underground railway extensions with which his companies are associated will cost £16,000,000.

The spaciousness of the new cars and their easy and comparatively noiseless riding qualities were commented on at the opening run. It is proposed to call the reconstructed line "The City Railway."

On the opening day, beginning at 12:30 p.m., the passengers carried totaled 95,000, including 15,000 who were provided with free tickets. The bulk of these free tickets were not presented until after 7 p.m. Their holders were then accompanied by their wives and families, all riding the entire length of the line and back. No fewer than 500 passengers purchased season tickets

at Clapham Common or took away forms for that purpose.

On the second morning the travel was unprecedented. Dense traffic presented itself at Clapham Common, Stockwell and Elephant Stations. At 5:30 a queue of more than 200 passengers lined up at Clapham Common booking office. Additional booking clerks were at once rushed to the station, but even then the queues showed no signs of abating. Ultimately, a number of ticket collectors provided with tickets from the booking office paraded along the queues and did a roaring business. This stream of passengers two and three deep was maintained until after 9:30 a.m.

Zone Check System Used on P.-O. One-Man Interurban Lines

BY H. H. BEST

Traffic Engineer Pennsylvania-Ohio Electric Company

ONE of the biggest problems in one-man interurban operation is to provide a convenient, speedy, practical, inexpensive and workable system of fare collection. The tariff rates on the interurban lines of the Pennsylvania-Ohio system are arranged by zones. It was logical, therefore, to inaugurate a zone-check system for the identification of passengers. On the line between Youngstown, Ohio, and Sharon, Pa., there are 10 zones, the through fare being 35 cents. The interurban line between Youngstown, Ohio, and New Castle, Pa., consists of nine zones, the through fare being 45 cents.

Ohmer registers are used for "pay-as-you-leave" collection of fares. Each zone has a differently colored check. These are carried in a convenient container mounted on a pedestal at the rear of the register. The checks are of thin cardboard 1½ in. x 3½ in. in size. Each check carries the number of the zone in which it was issued, the names of the stations in that zone and the exact rates to all other points on the line. One side of the check covers eastbound traffic and the opposite side covers westbound traffic.

A check is issued as the passenger boards the car except in the initial zone. Passengers who do not have checks as they leave the car are required to pay the maximum fare. The non-issuing of checks to passengers in the initial zone has the advantage that passengers who board elsewhere and who are entitled to them will be sure to get zone checks when they board and to return them to the operator when they leave.

Commutation tickets, school tickets, reduced-rate

1

STATIONS
Youngstown & 14
EAST BOUND
TO

STATION	FARE
14	.05
28	.10
44A	.15
50	.20
Sharon	.25

Retain this check and return same to operator when fare is paid as you leave car

THE P. O. P. & L. CO.

1

STATIONS
14 & Youngstown
WEST BOUND
TO

STATION	FARE
Youngstown	.05

Retain this check and return same to operator when fare is paid as you leave car

THE P. O. P. & L. CO.

2

STATIONS
14 and 27
EAST BOUND
TO

STATION	FARE
28	.05
39	.10
40	.15
44A	.20
50	.25
Sharon	.30

Retain this check and return same to operator when fare is paid as you leave car

THE P. O. P. & L. CO.

2

STATIONS
27 and 14
WEST BOUND
TO

STATION	FARE
Youngstown	.05

Retain this check and return same to operator when fare is paid as you leave car

THE P. O. P. & L. CO.

3

STATION
28
EAST BOUND
TO

STATION	FARE
28	.05
39	.10
44A	.15
50	.20
Sharon	.25

Retain this check and return same to operator when fare is paid as you leave car

THE P. O. P. & L. CO.

3

STATION
28
WEST BOUND
TO

STATION	FARE
Youngstown	.05

Retain this check and return same to operator when fare is paid as you leave car

THE P. O. P. & L. CO.

10

STATIONS
47 and Sharon
EAST BOUND
TO

STATION	FARE
Sharon	.10

Retain this check and return same to operator when fare is paid as you leave car

THE P. O. P. & L. CO.

10

STATIONS
50 and 48
WEST BOUND
TO

STATION	FARE
40	.10
28	.15
29	.20
14	.25
Youngstown	.30

Retain this check and return same to operator when fare is paid as you leave car

THE P. O. P. & L. CO.

These Zone Checks Tell the Passenger the Exact Fare to Any Point on the Line. One Side Is Used for Each Direction

strip tickets, reduced-rate round-trip tickets, full-rate cash tickets, free transfers, paid transfers, trip passes, card passes and weekly passes all are used. The flexibility of the zone-check system permits the collection of fares in this multiplicity of ways. On the Youngstown-Sharon line through service is operated on a 30-minute headway. These through cars, on which the zone-check system is used, carry an average of 135,000 passengers a month or approximately 4,500 daily. The zone-check system has been in service for more than 6 months on the Sharon line. It has proved so successful that a similar system has been installed on the Youngstown-New Castle line and on the Youngstown-Warren line.

A desirable feature in connection with the use of these checks is an improvement in public relations which can be attributed directly to the system. The use of the checks has facilitated the loading of cars at all points on the line. It has eliminated the necessity of a passenger asking questions of the operator regarding the fare, as the check tells just what fare to pay and when to pay it. It has reduced to a minimum the necessity of the operator making change for passengers, as generally the passenger will present the exact change if he knows how much the fare is. From the standpoint of the company, the operators who handle the work, and the traveling public who use the service, the zone-check system has been a marked success.

Telephone Dispatching Saves Time of Work Cars

THE track maintenance department of the Boston Elevated Railway believes that its labor-saving machinery should be kept in service as much as possible. In order to accomplish this a telephone dispatching system for work cars and trucks has recently been adopted. Brief mention of this system was made in an article describing the use of track machinery in Boston published in *ELECTRIC RAILWAY JOURNAL* for March 17, 1923, page 458. Since that time, however, the system has been modified and extended.

Each foreman on a track construction job telephones the dispatcher's office about 3 o'clock in the afternoon and tells him the quantity of material which will be needed for that job the next day. The hour at which it is needed is also specified. If the quantity is small, delivery is made by motor truck. If the quantity is as much as, or more than, a carload, delivery is made by one of the company's work cars. After having heard from the various foremen, the dispatcher works out his program for using his cars and trucks the next day on work needed.

Trucks are ordinarily employed in the removal of waste incident to track reconstruction. This work can be done by motor truck without blocking the rail, whereas the use of an electric car might somewhat delay the regular passenger service.

Men are borrowed from the transportation department to operate the work cars. Only as many are asked for as will actually be needed. When slow loading material is being handled, trainmen are transferred from one car to another, rather than allowed to remain idle during the time the car is being loaded. Details of this kind are carefully worked out the day before in the dispatcher's office.

No special forms are used by the work car dispatcher. He simply notes the material required by the foremen and the hour at which they require it when they telephone to him. He then prepares the schedule for as many cars and trucks as he expects to need the next day.

Railway Equipment Used to Remove Snow by City

THE people of Toronto, Canada, are quite accustomed to snowstorms, but one of unusual severity required special effort in order to relieve traffic conditions. The Toronto Transportation Commission, which operates the street railway, cleared its tracks of snow quickly and with little interference to service. But as other parts of the streets were not cleaned, the car tracks were used for all traffic, which caused considerable congestion and affected general business conditions. Prompt action by the city department was necessary, and so arrangements were made with the Toronto Transportation Commission for the use of its tracks and equipment in cleaning snow from the sides of the streets.

In order that the passenger car schedule should not be interfered with nor the street car tracks be blocked



Dumping Snow at Manhole for Disposal After Removing It from the Streets of Toronto

for vehicular traffic, the work was done between 12 o'clock midnight and 6 in the morning. Ten Differential dump cars, of the regular equipment of the maintenance-of-way department, supplemented by four flat cars, were used.

The snow was loaded into these service cars from the street by hand and taken to the nearest available manhole and dumped in. Accurate cost was kept by the city and comparison was made of this method of removal with previous methods where trucks and teams were used. The cost of loading and disposing of the snow by means of the dump cars was 17 cents per cubic yard, including rental of the car, based on the regular rental price established by the Toronto Transportation Commission; all labor in loading, and the labor in shoveling that part of the snow which did not fall into the manhole as the cars were dumped. The Differential dump cars are 40 ft. 6 in. long and are propelled by four motors.

The cars carry a load of about 25 cu.yd. per car. The cost of labor for loading and unloading the flat cars was approximately 5 cents per cubic yard more than with the Differential dump cars.

Graphs of European Tramway Statistics

THE accompanying graphs are from a report on "Fares in Northern and Central Europe," read at the Homburg meeting of the Internationaler Strassenbahn Verein last September by August Winter of the Vienna Municipal Tramway. An abstract of this report was published in the *ELECTRIC RAILWAY JOURNAL* for Nov. 29. In these charts, the author gives the relations between the lengths of tramway lines, passengers carried, and populations of the districts served for some 47 systems in northern and central Europe from which statistics were collected. These statistics were divided into four groups as follows: (1) systems in German cities; (2) systems in Norway, Sweden, Denmark and Holland; (3) systems in Switzerland; (4) systems in the various countries formerly forming the Austro-Hungarian monarchy.

Chart Fig. 1 shows the relation between the length of route, measured in kilometers (or miles) of single track, and the number of inhabitants in the city served.

The second (Fig. 2) shows the relation between car-kilometers (or car-miles) run and length of line. This the author calls service load and it might be considered an index of service. As will be seen, the line rises rapidly with the size of city served.

The third (Fig. 3) shows the relation between car-kilometers (or car-miles) per unit length of track and population of the city served. This the author calls service density, and plots two lines to indicate the averages in each of two groups; i.e., German and all other roads. It will be noticed in both lines that the ratio of car-miles to miles of route increases with the size of city served, but in varying degree.

The fourth (Fig. 4) shows the number of passengers

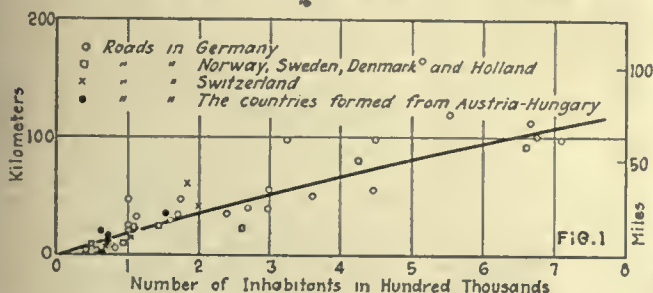


FIG. 1

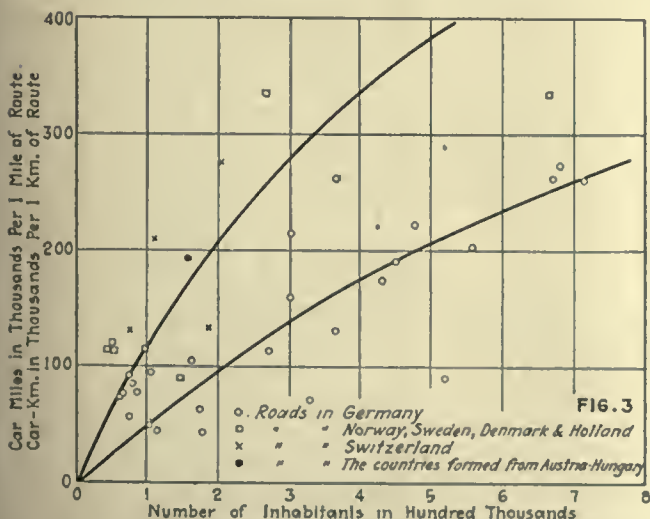


FIG. 3

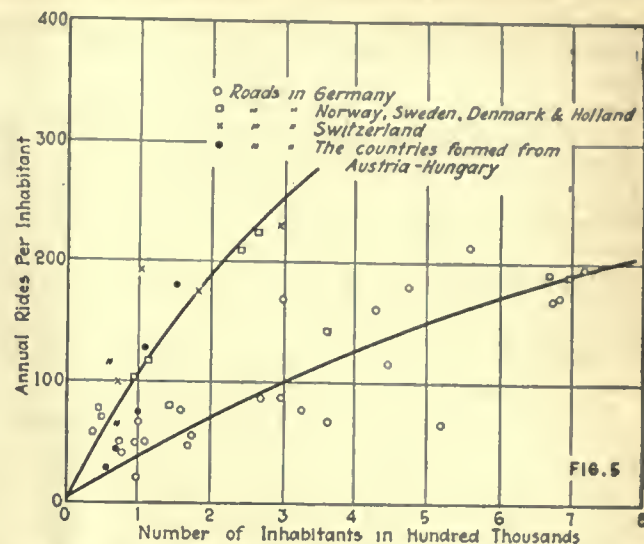


FIG. 5

Fig. 5—European Tramway Statistics: Rides per Inhabitant in Cities of Different Size

carried in cities of different size, and the chart Fig. 5 shows annual rides per inhabitant in cities of different size. This index is usually known as the riding habit. In both of these charts, as will be noticed, the curves take the general form that might be expected in American cities, though the lower riding per inhabitant in the German cities as compared with the other groups is very marked. Of the groups outside of Germany, the Swiss roads seem to show the greatest riding per inhabitant. Some of this additional riding may come from the greater number of tourists in the Swiss cities.

The charts as presented originally showed metric dimensions only. English equivalents have been added.

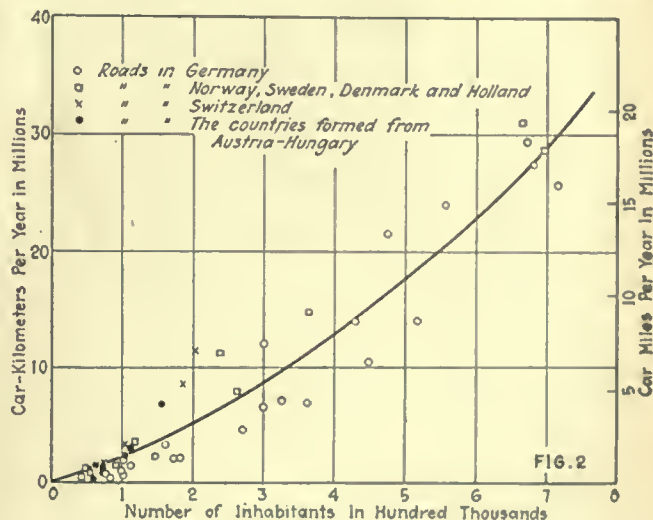


FIG. 2

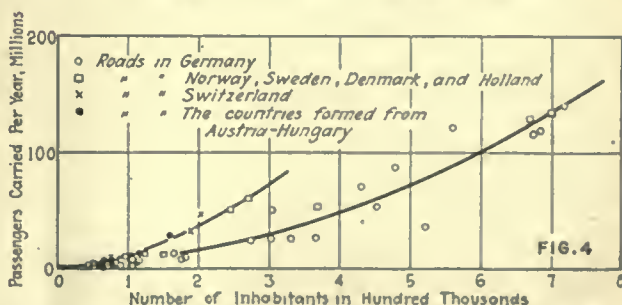


FIG. 4

Statistics of Railway Service According to Population from Tramways in Northern and Central Europe

Fig. 1—Route lengths in cities of different size.

Fig. 2—Tramway service given per inhabitant in cities of different size.

Fig. 3—Service per unit length of route in cities of different size.

Fig. 4—Passengers carried in cities of different size.

Association News & Discussions

New Yorkers Discuss Interurban Service

Light-Weight Cars, Motor Trucks, Freight Traffic and Fare Collection Are Taken Up at the Midwinter Meeting of New York Electric Railway Association—Developments in Gas-Electric Buses, High-Voltage Insulators and Discipline Also Topics

NEW types of passenger cars and methods of operation in interurban service were the features of the midwinter meeting of the New York Electric Railway Association, held at the Hotel Commodore, New York City, on Jan. 22. The opinion generally expressed was that light-weight one-man cars have proved satisfactory and have not only reduced costs but have given better service to the public than the older types of heavy cars.

The morning session was opened with a paper on modern fare collection methods by W. P. Butler, president Johnson Fare Box Company, New York, N. Y. He described the mechanism of the new type "J" automatic coin switch fare box manufactured by his company which was developed with and first applied on the cars of the Brooklyn City Railroad. Speaking of the experience on that property Mr. Butler went on to say:

"There were 220 of these machines installed on the cars of the Brooklyn City Railway more than a year ago, and the result of their operation has been most gratifying to the management as well as ourselves. These machines were not hastily built nor were they perfected without making mechanical changes to meet the full operating requirements. This work required constant study of platform operations over a period of months before it was finally perfected.

"The 'J'-type box eliminates the human element. The coin does the work and each coin deposited in the slot gives instantly an audible and visible registration at its value. It provides means for making positive inspection. The conductor is accorded ample means for observation of fares deposited. He can see, in most all cases, what is being placed in the slot; if he is not certain, he has the facilities of the intermediate inspection plate within the fare box. The coin, after registration, drops upon this plate, where clear visibility is afforded, and the coin remains in this position until it is released by the following coin.

"The instantaneous feature of registration occurring with the coin itself provides for maximum collection of the passenger revenue. We are advised that on the Brooklyn City Railway lines, after these devices had been in operation one year, the revenue increase attributed to the Johnson box is 4 per cent. This expressed in terms of money approximates \$500 per year per car equipment, which in turn rep-

resents in round figures four times the cost of the entire equipment. I do not know of any equipment investment that pays a higher return.

"The speed with which the passenger boards the car and makes fare payments is most gratifying. It has shown conclusively on the Brooklyn operation and on the Public Service of New Jersey, where a test has been in progress for some months, that this box speeds in double-quick time the platform passenger movement and affords a splendid contribution to time saving.

"It has its attraction from the public viewpoint too. The rider appreciates the opportunity of quick fare payment and his uninterrupted passage into the car, where vacant seats may be few. Psychologically, there is a thrill in hearing the bell ring in the register; it is an innovation and it is these things that please. It helps to bring home to the riding public the advantage of having exact fare ready."

In the discussion which followed, C. E. Morgan, president of the association and vice-president and general manager Brooklyn City Railroad, confirmed the statements made concerning the successful experience of his company with automatic fare boxes. H. G. Tulley, president International Railway, Buffalo, said that his company abandoned the use of fare boxes last November. It was felt by the management that the conductor had a better chance to get fares from all passengers if he collected them personally. With multiple-coin fares particularly it is difficult, he said, to be sure that each passenger deposits the right amount. E. M. Walker, president Schenectady Railway, concurred in part. He said that while the fare box is probably ideal for single-coin fare collection, it is not entirely satisfactory with multiple-coin fares.

FREIGHT TRAFFIC

"Freight Traffic—Its Source and Developments," was the subject of a paper presented by F. W. Brown, general superintendent Michigan Railroad, Grand Rapids, Mich. An abstract of this paper appears elsewhere.

In the discussion on this subject F. W. Watts, general express agent New York State Railways, said that his company had put in operation motor trucks supplementing the electric lines and primarily for short-haul service. The trucks had been in service for so short a time that no definite figures could be given as to the financial re-

sults. In some cases, shippers had expressed a preference for trucks rather than electric cars, even at a higher rate, because better speed could be made. The longest route on which these trucks are being run is 22 miles, and service is given to some places which are not reached by trolley.

H. C. Stanton, general freight and passenger agent Rochester & Syracuse Railroad, said that company was making a study of the truck business, but as yet had not engaged in it.

T. C. Cherry, general manager Rochester & Syracuse Railroad, suggested the association should take the position that motor trucks engaged in the general transportation of freight should be classed as common carriers by the state and placed under the supervision of the Public Service Commission. This suggestion, on motion, was referred to the legislative committee.

There was no discussion on the paper on "Light-Weight Interurban Cars," by W. J. Clardy. This appears elsewhere in this issue.

LIGHT-WEIGHT INTERURBAN CARS

In the absence of J. M. Bosenbury, his paper on interurban one-man operation on the Illinois Traction System was read by W. J. Harvie, vice-president of the association. An abstract appears elsewhere in this issue.

In a written discussion F. E. Fisher, general manager Illinois Valley division, Illinois Traction, Inc., described some of the things that have been done to facilitate one-man operation with these cars. Spring switches have been installed at all meeting points and overhead frogs at the turnouts. Where single-end sidings are in use the spring switches are so arranged that the operator of the car first arriving at the meeting point can unlock the switch, go into the siding, reset the switch for the main line and then after the other car has passed can back out and proceed without leaving his position on the car. For train dispatching jack boxes have been placed on the poles with telephone sets on the cars. This permits the same train-order system to be used as with the two-man cars. Fare collection is done with Ohmer registers, which are worked by pedals and are so placed that the majority of the passengers can see the reading. Hat checks are issued by the conductor and are collected when the passengers leave the car.

George L. Kippenberger, assistant manager St. Louis Car Company, sketched the extreme conditions of competition now existing due to the development of highway transportation methods. He mentioned the demand that exists among the public for "something new." This has been satisfied to a considerable extent by the motor bus. He feels that an interurban car with

the same features as those which have been adapted to the de luxe type of interurban bus would draw passengers back to the railway, as it is possible to make them materially better than can be done with vehicles running on the highways. Following the formal discussion a moving picture was shown illustrating the actual operation of the Illinois Traction cars that had been described.

In the informal discussion which followed, J. C. Thirlwall, General Electric Company, remarked that while until recently 1,000 lb. per mile per hour of free running speed was considered the lightest weight that was feasible in an interurban car, recent cars have been built weighing not more than 40,000 lb. for a maximum speed of 50 m.p.h. The reorganized Buffalo & Erie Railway has just begun operating cars weighing 37,000 lb. at a speed running well over 50 m.p.h. With good weather, he said, it would be possible to bring the maximum speed up to 60 m.p.h.

The old idea was that light-weight cars were inherently flimsy. Modern light-weight types, however, have proved satisfactory. The Western Ohio Railway is operating 34,000-lb. cars which stand up well in high-speed service. A similar record has been made by the Dallas-Terrell line. The maintenance of 34,000-lb. cars on this line has been brought to a very low cost. The Kentucky Traction & Terminal Company is operating similar cars up to speeds of 40 m.p.h. After making 330,000 miles per car, the maintenance cost last year, which was the third year of service, was at the rate of 1½ cents per car-mile.

Carl H. Beck, Westinghouse Traction Brake Company, pointed out the necessity for very high braking rates for all cars that have to run in city street traffic. This demand has been met by the variable load brake, which permits the same braking ratio for a full car as for an empty car and makes possible much quicker stops in traffic with resultant reduction in accidents.

An interesting paper on "High-Voltage Insulators and Their Relation to Radio as Affecting Railways" was read by G. B. Smith, engineer Ohio Brass Company. He spoke of a number of the problems of insulation of power transmission lines at 100,000 volts and over. The interference with radio reception produced by imperfect insulation has resulted in finding many defective insulators. He cited a case where radio co-operated to locate a section of track where the bonding was poor, so that the railway was able to correct the difficulty. An interesting development mentioned by Mr. Smith was the use of high-frequency currents for telephoning over power transmission lines. He said that this made it possible to transmit messages where the use of ordinary telephone lines was impossible and assisted materially in assuring continuity of power service. Following the presentation of his paper, Mr. Smith showed a number of lantern slides illustrating different methods of controlling high frequency discharges and the effects of screening to prevent flashovers.

A paper describing the development

of gas-electric buses was presented by J. C. Thirlwall of the General Electric Company. This was discussed by J. A. Queeney of the Philadelphia Rural Transit Company. Abstracts of this paper and the discussion are published elsewhere in this issue.

Dr. F. S. Macy of the Brooklyn-Manhattan Transit Corporation presented a paper in which he discussed the essentials of discipline. This also is abstracted elsewhere in this issue.

The afternoon session was concluded by a short progress report by the accountants' committee of the association, which was read by its chairman, E. H. Reed, auditor Brooklyn City Railroad.

The principal speaker at the dinner was Clifford E. Paige, vice-president Brooklyn Union Gas Company, who said that public sentiment was changing in favor of the public utilities since

they have been giving more attention to winning the confidence of the public. The street railways are now advertising their business more extensively than ever before. Their best salesmen, however, must be "contact men"—conductors or motormen. Courtesy, he said, is never an accident but always a development, which should be fostered in all those having to deal with the general public.

President Morgan announced that this was the largest meeting the New York Association ever held, some 750 being present at the banquet. Nine past-presidents of the association were in attendance. J. K. Choate responded for these past-presidents with a few fitting remarks. The meeting concluded with a humorous address by the Rev. W. W. Giles of East Orange N. J., who spoke on "Personality—The Business Man's Greatest Asset."

Interurban Freight Traffic—Its Source and Development*

Importance of Developing Additional Source of Revenue for Interurban Properties—Use of Motor Trucks in Connection with Electric Railway Lines Opens Up New Possibilities—Joint Rates and Through Billing Important

By F. W. BROWN

General Superintendent Michigan Railroad, Grand Rapids, Mich.

FREIGHT traffic handled by electric lines in the last 10 years has increased fourfold, the freight car-miles operated have increased two and one-half times and the freight equipment has been doubled. This of itself ought to be a convincing argument in favor of freight traffic as an undeveloped source of revenue.

Many electric line managers now recognize that the greatest opportunity for development lies in freight service, and realize that the standardization of equipment, the possibilities of more through and competitive rates between cities and stations, the operation of longer trains, and the loading of cars to capacity are all important factors to successful and profitable freight transportation.

There are still a number of difficulties that have not been overcome, not the least being that so many of the lines operate over city tracks, and are therefore subject to municipal regulations as to the hours during which they may haul freight cars, or the number of cars in such train, also the type of equipment required by such municipalities.

On the side of personnel, it is important that all the employees be efficient. One incompetent or disagreeable employee coming in contact with the public will offset the work of several capable and excellent men. To be more specific—I would say that one local freight agent who is curt, or has not the faculty of meeting and pleasing the public, can do more harm than can be overcome by several solicitors, or by several months of first-class service.

*Abstract of a paper before the New York Electric Railway Association, New York City, Jan. 22, 1925.

Therefore, the right men should be engaged as local freight agents, the right sort of solicitors put in the field, and the right men to handle freight claims are essential to the success of the undertaking. To be too saving in salaries at this point might easily be fatal to the whole project. Any solicitor who cannot increase the business five times over and above his salary is in the wrong field.

SOURCES OF FREIGHT TRAFFIC

Where can we look for traffic? First, in our own immediate territory; second, in adjacent territory. It is astonishing how much new business a solicitor will find in a territory that he has worked over and over again, by knowing intimately all the sources of traffic, and the men who control it, and by acting promptly on tips he receives, or things that come under his observation, often accidentally caught from some casual source.

Another feature, and one which has not been greatly developed, is to use truck lines for reaching towns not now served by electric railways. From nearly every terminal of any importance there are truck lines operating to villages and towns within a radius of 30 miles, that should become feeders of the electric line, through rates and through billing being provided. In other words, the truck line in this case would become an extension of the electric line. There is no reason to believe but that such service can be successfully developed, and is one of the fields now open to electric lines. Any number of localities not well served by steam roads on account of their location on branch or short lines would be susceptible to a far greater develop-

ment if they had better transportation facilities. It is not meant by this that the truck, in connection with electric lines, is expected to deprive the steam railroads of their business, but that with additional transportation facilities there will be more traffic to move. This co-ordinates the truck and the electric railway to the mutual benefit of both.

Electric railways should endeavor to locate industries on their lines, and while it has not yet become possible in all cases to handle standard M.C.B. equipment in road haul, as all lines are not physically able to do so, and also because of the objection of steam roads to pro-rating with electric railways, for the present revenue may be obtained from handling such equipment in a switch movement. However, we should not say that the electric lines should not expect to be able in the not far distant future to move traffic in connection with steam railroads. There are a number of the larger steam lines which have fought this for years, but there are signs of a break among some of the other lines, and I believe it is not impossible, with the right kind of effort, to establish joint rates in connection with certain steam lines, very much to the advantage of the electric. In view of the experience of the past this may seem a bit visionary, but it is not so; we have not gone after it half hard enough.

Another opportunity that is opened can best be presented by relating an actual experience: An electric railway served a celery-growing district and had for a number of years counted on that business as certain. It was regular until the motor truck came into the field and picked up the celery at the grower's place and transported it direct to the market, some 25 miles distant. The representative of the electric immediately started to develop another market for this celery and, after bringing the commission men from another city and growers together, succeeded in developing a business the second season that totaled 100 carloads. The new market was 200 miles distant and is not likely to be affected by the motor truck.

THROUGH RATES IMPORTANT

Through billing and competitive rates should not be overlooked. Agents should be able to quote promptly the through rate to as many points as it is possible to establish. A truck haul between two terminals may be necessary, but that can be arranged; make the truck line part of the through transportation and participating in the through rate; but where lines can be made to connect, through cars should be run.

These cars should serve the double purpose of affording the shipper the through service and saving the cost of frequent handling. Every time a shipment is handled it adds from 50 cents to 75 cents to each ton so handled, depending on the volume. The through rate, and especially the through service, appeals most to the shipper and increases the importance of the electric railway in his mind.

One other matter I should like to mention. That is to appeal to managers not to handicap their traffic de-

partments by failure to furnish facilities for the development of freight traffic. Many a traffic manager has become discouraged when he sees where business can be obtained but cannot be handled for lack of terminal facilities, or other conveniences necessary.

Additional facilities, oftentimes provided with the expectation that such would take care of the needs of the traffic department for some time, are found to be taxed to their utmost in a very short period after being provided.

Essentials of Discipline*

Principles Underlying the Methods Used by a Large Electric Railway in Obtaining Loyalty and Co-operation from Its Employees

By F. S. MACY

Physician-in-charge, Medical Bureau of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y.

DISCIPLINE is essentially teaching, training, the cultivation of some particular belief or code, education in some especial occupation or profession. Industrially, discipline is any method, system or kind of training designed to accomplish profitable results by regulated, co-ordinated, combined efforts.

Good discipline begins with the proper selection of employees. Given the men, the next point is in recognizing the principle that control of the mass is based upon the control of the individual. All discipline narrows down to that. And the secret of controlling the individual lies in knowing and in understanding every employee to the limit of our ability in that art. In addition certain conditions must be fulfilled or fostered as the case may be. For instance, respect for himself and his boss; for he cannot give the full measure of return to his company unless he respects it, and he cannot respect it unless he honors himself in working for it. And he must respect his boss because he is a disciple of the boss, who, to him, the employee, typifies the company. Courtesy is one road to respect. "Please" and "Thank you" are the most powerful words in industry. They make unnecessary many pages of rules, because they prompt consideration and forethought.

Courtesy, to be exacted from the men, must be punctiliously extended to them by their chief. A man must not be treated like a yellow dog if he is expected to act and to work like a thoroughbred. Before a man can respect himself and act like a man, he must be treated like one. Even in reprimand, cold, calm courtesy is a weapon that baffles all offenders because it admits no rebuke in reply.

An employee must be loyal, otherwise he is an indifferent worker and a mere time server, so that his product falls below the standard of excellence that it is the object of discipline to maintain. Loyalty, like respect, is mutual if it is genuine. It is the cultivation of this spirit, mutual respect, mutual loyalty, mutual confidence in and fidelity to one another and the common code, that forms the basis and the very structure of military discipline and national security. We can have no better model.

It is usually easy enough to get men. It is quite another thing to keep them,

to train them into a high state of efficiency and to hold them after they are trained and hence most valuable. Nothing else helps in this respect so much as these few principles so briefly outlined. The individual must be intelligently studied and analyzed, so that he may be fitted into his right place as a cog in a machine; he must respect and be respected. He must be loyal, and the company must be faithful to him. The net result is an appeal to the sense of personal possession. The man comes to look upon the company as something so intimately associated with himself as to be, in a sense, his own; the object of his affection and pride, upon whose prosperity his own depends, in the spirit of which he lives and for which he would die, and not seldom does, especially in the railroad industry.

So much depends upon the superintendents or the immediate bosses of the men in cultivating the essential qualities of concerted effort that a corporation is largely what these men make it. Personal bias or preference manifested in the guise of office are fatal to discipline. The privileges the boss confers, the preferences or promotions he recommends must have no foundation of friendship. On the contrary, to promote, for example, a man on his merits but known to be personally distasteful to the boss, is a master stroke of discipline when the occasion justifies it; because it is a visible evidence of a square deal, an advance untainted by personal considerations. And just as he must not be influenced by personal favoritism to confer privileges, so, too, he must not use his official position to obtain favors for himself. To borrow money from subordinates, for example, or to gamble with them, is worse than dangerous.

Yet the personality of the chief is bound to be reflected in his performance of duty, nor do I maintain that it ought not to be. Indeed, the right kind in the right way is necessary. Neither do I mean that he should not do humane, kind things officially when I say that his office is impersonal. On the contrary, he should study to do those things for reasons I have given. But I do make a distinction between personality in the sense of character and personal attributes as biasing factors in office.

When I say that the chief should be approachable I have in mind what I call the open-door policy. This consists simply in giving every man a hearing

*Abstract of a paper before the New York Electric Railway Association, New York City, Jan. 22, 1925.

no matter how perfectly the merits of his case may be known. If for no other reason the practice is desirable because it adds to general confidence, and to the chief's fund of information about men in general. One can always get a new viewpoint, useful, perhaps, on some other occasion. Besides, no matter how thoroughly subordinates are trained in the policies of the boss, as they must be, differences are bound to arise and it is one of the most important duties of the chief to see that these are adjusted.

Occasionally it will be found that the man is right and the chief's assistant wrong. In such cases the assistant must always be sustained, in appearance. The chief should hear all parties concerned and then follow up the case to conclusion, as an added source of information concerning the qualifications of his personnel, and to assure himself that justice has been done. He must also be equally scrupulous in analyzing himself and in correcting such mistakes as he himself may make. It takes a big man to say to his inferior, "I am wrong in this case," but he seldom loses by doing so.

The open door naturally suggests the closed door; in other words, punishment, which is often confused with discipline itself. Appreciation, commendation, appeal to the common spirit, are often far more effective and better means politically of securing or maintaining discipline. Nevertheless, punishment is a valuable and necessary aid in appropriate cases, though theoretically it is a confession of weakness, an admission of inability to cope with a situation intellectually. Sarcasm, loud bawling, angry epithets, are cowardly and weak because they admit no official reply or explanation and reduce a judicial process to a personal quarrel. For the same reasons, no man should be allowed to be impudent or disrespectful to his chief. The boss should put him out and resume the matter when, and as soon as, it can be settled coolly and judicially; and if he finds his own gorge rising to the spillway he should promptly dismiss his man until he can control himself.

Know everything that is going on; not by spying or through spies, but in the open with keen ears and keener eyes. Let praise or approval be bestowed in the open. But let reproof and reprimand be administered behind the closed door. Public humiliation destroys self-respect and antagonizes all who witness it.

Punishment or penalties should seem to be the natural consequence of the offence. They must therefore be appropriate, even ingenious, and duly proportioned to the circumstances, but never degrading.

Discharge is a terrible thing, both economically and humanly. It deprives the company of a man more or less trained, and it causes human suffering. Yet it is necessary at times, for the good of the whole. It has but one legitimate function, the elimination of the hopelessly unfit, the incurable agitator who undermines the common prosperity and the man who has proved himself temperamentally or otherwise not amenable to any constructive influence. But remember that

the incorrigible and the incompetent may be only square pegs jammed into round holes.

One cause of resentment among men at being penalized is the feeling that the boss is on a plane so much higher than themselves that he cannot understand them. To overcome this I devised what I called a "Discipline Board," composed of an odd number of men with excellent records and suitable qualifications in general. Complaints and infractions were referred to this board. I retained the approving and amending powers, for obvious reasons. And made it plain that the board was advisory only. I often mitigated, but I never exceeded their findings if these were adverse to the man concerned.

This board accomplished several things. Men felt that they had been tried by a jury of their peers, and there was never a question of fair treatment. Membership on the board was an expression of the highest commendation and furnished a wonderful incentive to good work. It provided me with a number of men undergoing practical training in the judicial side of management from whom I could choose a tested assistant as occasion arose. It operated as a buffer between the men themselves and the consequences of individual prejudice or misunderstanding. It strengthened rather than weakened my own position by promoting contentment and inspiring confidence in me as a man and an official. Incidentally it saved me some terrific strains on my temper.

Now comes the question, how may one judge whether discipline is good or bad? Here are a few tests:

Is the quality of the output what it should be?

Do the men work willingly and come to their duties promptly and cheerfully?

Are there incentives such as the prospect of advancement, pension, etc.? In other words, can they see something ahead for themselves? These are essentials to contentment, and contentment is necessary to loyalty or company spirit.

What is their opinion of the boss? It ought to be that he is a fine man who can be hard as nails when occasion demands.

All things considered, is the labor turnover high or low? If it is high there is something wrong in working conditions. Too often it means injustice and wrong principles of control; poor production as a result of untrained and discontented workmen and consequently too high an overhead and lower profits.

Is the sick rate higher or lower than conditions warrant? The higher the rate the more likely it is that men are malingering to escape hateful conditions and that they are therefore lacking in loyalty. In general, too high a sick rate has the same significance as an excessive labor turnover.

Are punishments and penalties imposed in excessive numbers? A high punishment rate reflects discredit upon the boss, as a rule, and indicates a fault in his ability to understand and train his men. On the other hand, an exceedingly low rate must not be taken as an index of high discipline without corroborative indications.

Finally, analyze every disciplinary incident. Take it apart and see how it is humanly made. There is a lesson in every one. Superintendents should discuss their difficult cases with one another; transfer them from one to another to observe the effect of change of environment and personality on efficiency. Indeed, if the art of discipline had been sufficiently cultivated in the beginning, the necessity for organized labor would never have existed; and if the art were even now as far advanced as it should be, the organized labor would have no justification. Discussions, experiences, opinions, all are productive. I offer you mine for such service as they may render.

Results with Light-Weight Interurban Cars*

By J. M. BOSENBURY

Superintendent of Motive Power Illinois Traction System, Springfield, Ill.

THE Illinois Valley division of the Illinois Traction System, consisting of approximately 101 miles of road, was originally built about 20 years ago. It was equipped with heavy double-truck two-man interurban passenger cars weighing approximately 94,000 lb. each and seating 56 passengers. These cars were operated on hourly schedules, but the decrease in business caused the operating officials to reduce the service to headways averaging about 2 hours, with few trippers morning and evening.

An analysis of the factors involved showed that the solution of the problem was a light-weight one-man interurban car. With this idea in view, the officers of the company directed the engineers to design a car that would as nearly as possible meet all of the requirements of the traveling public. Comfort and attractiveness were considered most desirable. This was provided by use of more comfortable seats, better heating and ventilation, better toilet facilities, easier egress and ingress and a pleasing appearance, both inside and outside. The car was equipped with all of the modern safety appliances and labor-saving devices. While it was of light weight, strength and safety were not sacrificed to obtain the desired result.

It was also considered that the car must be of an entirely new design, that would embody all of the good features of past practices and at the same time all desired new developments, incorporated in a car that would appeal to the traveling public and also be easily operated on an interurban line by one man.

The resultant car in general is a single-end, double-truck one-man interurban car with arch roof, having the main passenger compartment at the front and with a combination smoking, baggage and express compartment in the rear. [This car was described and illustrated in the *ELECTRIC RAILWAY JOURNAL* for Jan. 10, 1925—Ed.]

Particular attention was paid to insulating the car, both the roof and the side girder plates. To make the car

*Abstract of a paper before the New York Electric Railway Association, New York City, Jan. 22, 1925.

more comfortable in extremely cold weather, storm sash are mounted over the lower sash in long sections. These storm sash have small ventilators at the bottom, which may be operated from the inside of the car. The upper or Gothic sash are prevented from radiating heat by being protected on the inside with a $\frac{1}{2}$ -in. mahogany veneer panel, which gives a dead air space. This panel is hidden by the curtains which are arranged to stop with the lower edge at the top of the movable sash. This provides clear vision at all times. The car being single-ended, with the main passenger compartment in the front portion and without a front bulkhead, provides the passengers with a clear and unobstructed view of the track ahead and of the surrounding landscape.

The new service was started on an hourly schedule on Aug. 3, 1924, and operated in this manner until Aug. 20, at which time an unprecedented storm

accompanied by a cloudburst washed out a number of bridges and embankments. These unfortunate occurrences cut the line into several sections, making it impossible to operate through cars and maintain full service. So much damage was done that the reconstruction of the bridges and track was not completed until Dec. 4. Therefore, sufficient operating statistics to show the value of this new service are not available. However, the manner in which these cars were received by the public and the officials of the communities through which they operate, and the many former patrons that had been lost to other forms of transportation that have returned to these cars, indicate that they are meeting expectations, and that portion of the December report that is available indicates increased earnings and decreased operating expenses, which latter was materially affected by a large decrease in power consumption.

standard mechanical drive, asked us to submit a sample gas-electric equipment that would enable it to dispense with the differential and to use a dual drive. It felt, as many other operators do, that the differential itself is an inefficient and weak part; that it promotes skidding and wheel slippage in starting on slippery streets; that the hump in the center of the axle necessitates carrying the body higher than is necessary with dual drive. To build a mechanical dual drive appeared impracticable. With electric drive, it merely meant the use of two motors, mounted side by side and connected to two driving shafts.

Other objections to the ordinary automotive drive are the clutch and gear shift, which are short-lived, high maintenance parts. Moreover, as ordinarily used by drivers, they are weapons of mechanical assault and battery on the engine, chassis frame, bearings, and tires. In other words, the ordinary rapid acceleration of a heavy bus, with a gear shift, is a series of terrific torsional strains and of excessive engine speeds, that shorten the life of the engine, of the gearing, of the tires and of the whole vehicle.

Electric drive reduces the severity of the torsional stresses, applies the power in a smoother and more constant manner, greatly reduces the peaks of engine speed, and in frequent stop service appreciably reduces the number of engine revolutions per mile. The reduction in speed permits the use of higher compression and, together with the higher thermal efficiency of moderate engine speeds, results in fuel economy.

In frequent-stop service a driver will make from 1,500 to 2,000 shifts of the gears in a 9-hour day. The physical and mental strain of performing this duty is considerable. In addition, each shift requires that the driver take his hand from the wheel, and to some extent distracts his attention from the steering of his car. With the electric drive the entire speed control is in the foot accelerator and he need never take either hand from the wheel except to apply the emergency brake.

For the reason just mentioned, and because there is less danger of skidding, the passenger rides in greater safety. He is less apt to be thrown while standing in the aisle as a result of jerks in starting, and his comfort is enhanced by the lack of noise and vibration that is ordinarily so noticeable.

Equipment developed for use on the larger size buses, tests of which have been made in Philadelphia during the past eight months, includes a 25-kw. generator, weighing approximately 900 lb., directly connected to the engine. The particular engine used in the P. R. T. tests was a six-cylinder machine that developed 60 hp. at 1,200 r.p.m.

On its shaft has been mounted the armature of an exciter provided to obtain instant pick up of voltage as the engine is accelerated. (One of the objections to previous designs was a lag in voltage pick up that reduced acceleration of the buses.) The generator has a main series field and an auxiliary shunt field that is energized

Gas-Electric Drive for Buses*

Experience with Vehicles of This Type During the Past 20 Years Is Outlined—The Advantages Are Claimed to More Than Offset the Greater Weight and Original Cost

By J. C. THIRLWALL

Railway Engineering Department General Electric Company

MANUFACTURERS have been building various forms of gas-electric drives for rail cars, automobiles, buses, tractors and ships for 20 years or more, and a great deal of such equipment has been put into actual operation. In 1905 a single-deck bus was built for the Fifth Avenue Coach Company that was driven by a gas-electric set built by the General Electric Company. This weighed about 9,400 lb. and used a 40-hp. four-cylinder engine to which was attached a 12-kw. generator. Two motors were used with chain drive and a double-reduction gear, giving a maximum speed of 15 m.p.h.

Three years later 10 more buses were put into service by the Fifth Avenue Company, with similar equipment. These operated for about 6 or 7 years before being retired. The only criticism of their performance was the inferiority of their engines as compared with the De Dion type that had been adopted by the operating company for its other buses. Due to relatively lower engine speeds, the weight of the electrical equipment per kilowatt capacity was considerably higher than it is today. Nevertheless, these buses, designed throughout for the electric transmission, weighed only 347 lb. more than the buses with mechanical drive. A single-motor vehicle built in 1910 actually weighing 70 lb. less than the mechanical type, operated until 1917.

About this time the Tillings-Stevens Company in England began development along similar lines and since has carried it forward to a point where there are today in successful operation numerous fleets of these gas-electric

buses totaling some 1,500, about 300 of which operate in London.

In 1912 we installed a considerable number of gas-electric equipments on heavy-duty trucks, notably aerial ladder trucks for fire departments, street sweepers and commercial trucks of from 2 to 5 tons capacity.

In 1918, at the request of the War Department, we designed and built 90 mobile searchlight power units, one of which served at the front-line trenches in France. These trucks, weighing 9,000 lb., used an 80-hp. Cadillac engine and a 20-kw. generator and single motor. On test in February and March, 1919, one of these units went from Massachusetts to Florida and return, through exceptionally muddy clay roads, without a failure in any part of the driving mechanism. The first American tank had gas-electric drive, and two 80-ton 240-mm. gun mounts were similarly equipped.

During the same period, 1905 to 1915, we built some 90 rail car equipments, using 100-kw. generators with 175-hp. engines in combination passenger and baggage cars that weighed from 45 to 55 tons. A considerable number of these cars are still in active service after 15 years. Several of somewhat lighter weight have been sold during the past year.

An even more extensive commercial development was made in storage battery trucks, thousands of which are today operating in every class of commercial trucking. The American express Company, for instance, has a number of fleets of battery-driven delivery trucks aggregating some 1,600.

About a year ago Mitten Management, Inc., having decided to engage extensively in bus transportation and realizing the disadvantages of the

*Abstract of paper before the New York Electric Railway Association, New York City, Jan. 22, 1925.

by the exciter. The series windings build up a magnetic field in opposition to that created by the shunt winding, giving a nearly constant power, the voltage drooping at high current output and increasing as the current drops. There also is a neutralizing effect at low speeds, so that when the engine is idling the voltage generated is so low as to produce a negligible current throughout the motors. They can, therefore, be permanently connected to the generator.

While the generator has a nominal rating of 25 kw. in actual tests, its output varied from 500 amp. at 70 volts, or 35 kw., to 160 amp. at 200 volts, or 32 kw. Under tests that boiled the radiator of the driving engine it operated within safe temperature limits.

Two motors, weighing 440 lb. each, of the automotive type, barrel shaped, and of about 20 hp. on a railway rating, were used in these tests, with a double reduction gear ratio of 10.8/1. With this combination on a double-deck bus, which without load weighed 16,870 lb. and with full load approximately 26,000 lb., free running speeds of from 26 to 30 m.p.h. were obtained, depending upon the loads carried.

Rates of acceleration were very uniform, approximately 2 m.p.h.p.s. up to 10 m.p.h. and 1.5 m.p.h.p.s. up to 15 m.p.h. being the average of many tests. It was found that the buses with mechanical drive could equal these rates, but only by racing the engine through holding too long in intermediate gear positions. The normal engine speeds

while accelerating with the gas-electric drive were between 600 and 1,300 r.p.m. The maximum engine speed (at 30.5 m.p.h. bus speed) was 1,550 r.p.m. On hill-climbing tests, on grades of from 5 to 8 per cent, the engine speed varied only between 1,150 and 1,325 r.p.m.

With mechanical drive on second or third gear position engine speeds of 2,000 to 2,200 r.p.m. were frequently reached, and readings as high as 2,600 r.p.m. were noted, depending on the individual driver and his methods.

Schedule speed tests gave similar results. On various runs involving from three to nine stops per mile the drivers of the gas-electric bus established uniform records of schedule speeds. It was found that for short periods drivers on the mechanically equipped buses could, by abusing the equipment, get over the course in approximately the same time, but they all admitted that to maintain such schedules all day would be physically impossible.

The electric equipment and the dual-drive axle add some 1,800 lb. to the weight of a 66-passenger bus, less than 8 per cent of its loaded weight, and approximately 10 per cent of its first cost. Those are the only apparent disadvantages.

Against these may be set the greater comfort and safety for passengers and crews, lower maintenance and reduced depreciation on the entire bus and its equipment, greater mileage per gallon of gas or of oil, and higher schedule speeds.

less than 65 passengers and a 33-passenger single-deck coach the chassis of which would be an exact duplicate of the double-deck for the purpose of standardization. Our specifications stated that the electrical apparatus must have sufficient capacity to transmit the entire output of the six-cylinder 4x6-in. engine which we had designed and operated in order to demonstrate its advantages over the four-cylinder type.

The General Electric Company supplied all electrical equipment for the first coach, which consisted of generator, two motors and a reversing switch. The clutch, gear shift, transmission and rear axle of one of our 64-passenger double-deck coaches were removed and the generator and two motors substituted.

We placed the gas-electric coach on test alongside of an exact duplicate coach equipped with identically the same engine and conducted a series of tests extending over a period of months. We found that the gas-electric coach would accelerate rapidly, smoothly and quietly, being free entirely from the noise, shocks, stresses and strains set up in the mechanical drive coach, because of the abrupt changes in speed and torque as gears are shifted, depending largely upon the skill of the driver of the mechanical bus.

Incidentally, we learned that it was absolutely impossible to stall the engine of the gas-electric; i.e., with the coach at rest, you can instantly push the throttle wide open and the gas-electric coach will automatically accelerate to its free running speed rapidly, smoothly and quietly.

The faster schedule that can be operated with the gas-electric coach, because of the elimination of the time required in operating clutch and gear shift, is most important when we consider that our largest item of operating expense is trainmen's wages, which of course are materially reduced as the schedule speed is increased.

All of our tests and operation to date indicate, and I am convinced, that the tire mileage of the electric drive coach is very materially greater than the life of the same tires on the same coach with mechanical drive, due to the even torque applied to the wheels of the electric drive, while that of the mechanical drive is subject to great variation.

We are convinced that the operating cost of the gas-electric will be materially less than that of the mechanical drive and we base our opinion on our knowledge of the cost of operation of mechanical drive coaches as compared to the gas-electric drive in Philadelphia and various parts of the world, the cost of operating our trolleys and other electric vehicles, together with those facts which have been established during our tests.

I think that it will be interesting to call the attention of our mechanical men to the fact that at present it is the practice of motor coach operators to inspect the coach after it has operated 2,000 miles. This is a purely arbitrary decision. The inspection is a most costly one and includes removing of head of engine, cleaning out carbon, cleaning and grinding of valves, renew-

Philadelphia's Reasons for Gas-Electric Buses*

Constant Starting and Stopping of Buses in City Service with Clutch and Gear Shift Produces Strains in Body and Chassis That Result in Mechanical Trouble and Short Life of the Bus

By J. A. QUEENEY

Philadelphia Rural Transit Company, Philadelphia, Pa.

SIX weeks ago the Philadelphia Rural Transit Company, which is the motor coach organization of the Philadelphia Rapid Transit Company, purchased 200 gas-electric motor coaches, 125 of which are 66-passenger double-deck coaches and 75 of which are 33-passenger single-deck coaches. The Mitten Management has been studying the subject of motorcoach operation for several years. During these studies the conclusion was reached that in cities where motor coaches are in operation the street railway continues to carry a certain proportion of the people transported over the streets of that city and increases that proportion as the population grows. In cities where motor coaches are not in operation, the percentage of the people carried by the street railway decreases as the population grows, or, in other words, the private automobile increases in number and carries a larger part of the people transported over the city streets. With these facts before up, Mitten Management decided to supplement its railway system with the motor coach.

With a few exceptions, the type of buses in operation in various cities was really a truck chassis with a body mounted on it. We found it to be the opinion of bus operators that the life of the bus was somewhere between 3 and 5 years, a most startling situation to us who are accustomed to dealing with street cars whose life is admittedly not less than 20 years. We found that not only was the life of the bus relatively short, but its operating costs much higher than those of a street car of the same capacity, so we devoted much time to find the reasons for the shorter life and the higher cost of the motor coach.

In the Dec. 13 issue of *ELECTRIC RAILWAY JOURNAL* appeared an article by B. Hilburn, general manager Tulsa Street Railway, Tulsa, Okla., which summarized the defects of the ordinary mechanical drive of the gasoline bus and the rapid deterioration of the vehicle that results. This sums up in a few words one important reason why we decided to adopt the electric drive instead of the mechanical.

As a result of our studies we drew up what I might call fundamental specifications covering a gas-electric double-deck coach that would seat not

*Abstract of discussion before the New York Electric Railway Association, New York City, Jan. 22, 1925.

ing of oil, tightening of bearings and inspection and adjustment of numerous other parts. After the inspection is complete it is doubtful whether the engine is in such condition that it will operate at an efficiency of 90 per cent, 80 per cent or 70 per cent. The mechanic simply knows that the carbon has been cleaned out, that the valves looked good and that the engine is operating smoothly, without knocking. After it is operated 2,000 miles it is brought in again and the same procedure gone through, without knowing whether it is necessary or not. With the gas-electric the exact condition of the power plant can be readily determined by simply connecting the generator to a water rheostat, taking the speed of the generator, and the output at once determines the exact efficiency of the power plant.

The inspection and adjustment of the gas-electric equipment is therefore based scientifically on the work actually performed by the vehicle and not arbitrarily based on general experience. To obtain the same information with the standard mechanical-drive coach it would be necessary to remove the engine of the coach and connect it to a dynamometer, which of course is prohibitive because of the expense involved.

GAS AND OIL CONSUMPTION ON GAS-ELECTRIC VS. MECHANICAL DRIVE

The question that has been asked more often than any other, and consequently I assume is of great importance in the minds of those who make the inquiry, is, "Is the gas and oil consumption of the gas-electric greater than that of the mechanical drive?" I am afraid that many of the engineers and motor-coach operators have given more thought to the problem of increasing the miles operated per gallon of gas and oil than they have to the reduction of other expenses that go to make up the operating cost. As a matter of fact, the oil consumption of the engine of the gas-electric is approximately but 50 per cent of that of the engine of the mechanical drive, which the gas consumption is approximately the same, slightly in favor of the gas-electric.

The gas-electric coach has this further advantage, which is probably of particular importance to the operators of the smaller properties, and that is that the gas-electric with its motor drive is much closer to a street car and therefore in operating and maintaining it there will be less departure from standard street railway practice, particularly in the maintenance of the equipment, than with the standard mechanical drive bus, so that your present street railway equipment organization, because of its familiarity in the maintenance of electrical apparatus, will have no difficulty in caring for the gas-electric equipment.

On the contrary, the standard mechanical drive bus, in my judgment, requires a new force of men trained and experienced in the maintenance of the clutch, transmission and differential, which is entirely foreign to street car equipment.

Light-Weight Interurban Cars*

Results from Thirty-eight Properties Show Marked Economies and Other Gains—Most Desirable Features of Equipment Are Discussed

By W. J. CLARDY

Railway Engineer
Westinghouse Electric & Manufacturing Company

DURING the past 3 years a number of interurban properties replaced rolling stock with modern light-weight equipment and several interesting types of cars are now in service. An analysis of car weights between 25,000 and 60,000 lb. on 38 interurban properties which have purchased new equipment in the past 3 years indicates that the cars may be divided into three classes: (1) 25,000 to 32,000 lb. cars; (2) 32,000 to 40,000 lb. cars; (3) 50,000 to 60,000 lb. cars.

The first class includes 80 cars in service on 15 properties, and the average weight for this type of equipment is 28,000 lb. complete. The application of these cars has been confined to properties that have comparatively low schedule speeds which do not require free running speeds in excess of 45 m.p.h. Twenty miles per hour is a representative schedule speed for this class of service.

The average weight of the cars in the second group is 36,000 lb. complete, and a total of 152 cars distributed among 17 properties are considered. Most of the service performed by this equipment is of the same character as that in which the 28,000-lb. cars operate, that is, comparatively low schedule speeds requiring balancing speeds not exceeding 45 m.p.h. However, on a few properties, the 36,000-lb. equipments are applied in what may be termed high-speed service. In these instances schedule speeds of 30 m.p.h. are made, and the cars are capable of attaining free running speeds of 55 m.p.h.

The purchase of cars of the third class has not been extensive. Six properties are considered that are operating 137 such cars, and the average weight of these equipments is 57,000 lb. complete. Seventy-three per cent of the cars are in service on one property, and 84 per cent are applied where service is of a suburban character that does not require high speeds. The service is similar to what has been classed as comparatively low-speed operation, where schedules of 20 m.p.h. are typical and maximum free running speeds of 45 m.p.h. are not exceeded. The remaining equipment approaches the minimum weight limit of the 57,000-lb. class and has been applied to replace heavy cars in high-speed service requiring balancing speeds of 55 m.p.h.

The cars in the first two classes are representative of the lightest interurban equipments, and it is interesting to see that the average weight of 232 cars on the 32 properties is 33,000 lb. complete. Another important fact is that cars have been built corresponding

to all of the even thousands in weight between the limits of 25,000 and 40,000 lb. This variation indicates that it is not practicable to establish definite weight standards for interurban cars to meet certain service requirements. However, the average weights as determined for the three classes will assist in the selection of cars and car equipment.

ELECTRICAL EQUIPMENT AND TRUCKS

The application of motors to the three classes of cars considered is instructive in that the influence of weight and service requirements are very definitely pictured. Seventy-nine per cent of the 28,000-lb. cars are equipped with quadruple 25-hp. motors, and the remaining 21 per cent have quadruple 35-hp. motors. In all cases the weight of the cars which are equipped with the latter motor exceeds 31,000 lb. Eighty-eight per cent of the cars in the second or 36,000-lb. class are equipped with quadruple 35-hp. motors, and quadruple 40-hp. motors are applied on 12 per cent. The 40-hp. equipments are used on high-speed cars, and tapped field motors are utilized to obtain good free running speeds on cars which approach the maximum weight limit. In one case the application of the 35-hp. motor on a 34,000-lb. car provides a fairly satisfactory high-speed equipment, but the 40-hp. motor is better suited for this class of service.

The principal equipment used on the 57,000-lb. cars consists of quadruple 50-hp. motors. Eighty-four per cent of the cars considered in this class have this size motor, and 16 per cent are equipped with quadruple 60-hp. motors. In general, the 50-hp. motors are applied on the moderate speed cars, and the 60-hp. motors on high-speed cars. Tapped field motors of the larger size are used in several instances to assist in obtaining the desired high free running speeds.

Remote control is favored on the equipment in the 57,000-lb. class for either single car or multiple-unit service, and drum control is more extensively applied on the lighter cars when operation does not require trains. However, some of the properties which have heavy traffic and are operating the lighter types of equipment use multiple-unit control to solve their problems of mass transportation successfully. They have found that train operation provides the best means of handling a large number of passengers economically.

One interurban road operates a 10-mile line joining two moderate-sized towns which are manufacturing centers. New 36,000-lb. cars equipped with quadruple 35-hp. motors and multiple-unit control were recently placed in service and are proving very satis-

*Abstract of paper before the New York Electric Railway Association, New York City, Jan. 22, 1925.

factory. Two-car units are provided to handle the heavy traffic to and from the industrial plants during rush hours. The excellence of the service secured from these equipments is striking when compared to previous operation with single cars. A Western property operating 59,000-lb. cars finds multiple-unit control a necessity to provide equipments capable of meeting the severe requirements of a heavy suburban traffic.

The small-wheel trucks which are practically a universal application on the class of equipment considered are well standardized and are very successful in providing good riding qualities. Twenty-six-inch wheels are used on 97 per cent of the cars, while the remaining 3 per cent have 28, 30, or 33-in. wheels. Truck springs require careful attention, for in a number of cases it has been necessary to make changes in springs to secure satisfactory riding qualities.

CAR FITTINGS

In the light-weight interurban cars enumerated, careful attention has been given to the planning of every detail of the car body. The factors which have the greatest effect on bodily comfort are necessarily of first importance, and the principal items which have received exhaustive study are seat design, heating equipment, ventilation, type of windows and lighting system.

Plush seats are favored for main passenger compartments, and leather or some type of imitation leather for smoking compartments. On some cars folding slat seats are provided in baggage compartments for emergency use, but in general light-weight interurban cars are seldom in service where the entire seating capacity is utilized. The most comfortable seats are 38 to 40 in. wide, have high backs, employ deep automobile type cushions with substantial springs, and are spaced to provide ample knee room. Experience has shown that these are essential features, and the results obtained indicate that comfort rather than cost should determine the type of seat provided. There is no excuse for crowding seats on light-weight interurban cars as occurs in some cases, since capacity loads are seldom handled for long distances and consequently a slight loss of seating capacity is immaterial.

On single-end cars which have seats that are not reversible, the desirability of facing those adjacent to the smoking compartment forward and cutting the partition to obtain foot room is questionable. Some transportation superintendents favor the use of full-size seats facing the rear of the car, thus providing accommodations for two parties of three or four passengers who may desire seats together.

Electric heat predominates on the light-weight cars because it represents less weight, is easily controlled, maintains a good interior appearance and in most cases is effective in keeping cars warm. Hot water and hot air are used on some of the cars to reduce heating costs and provide better systems for severe climates. Where stoves are used, the most satisfactory location is in a fireproof baggage compartment,

and this arrangement does not increase weight if carefully designed. On cars which do not have baggage compartments the completely inclosed stove is desirable, even at an increased cost, since appearance is improved and cleanliness assured. In one case a weight reduction of 600 lb. was realized by using aluminum piping for the hot-water heating system but, of course, this increased the cost materially.

Good ventilation is essential to the comfort of passengers, and on the most successful types of light-weight cars the ventilating system has been carefully planned. Improved visibility, reductions in weight and close fitting sashes represent some of the accomplishments in window design which tend to enhance interior appearance as well as reduce construction costs. A single window with metal sash is being tried on some cars and seems very satisfactory. A number of the light-weight equipments have lighting systems that show how an interior can be improved by a definite plan to obtain effective illumination with attractive fixtures.

Other features which assist materially in providing the most satisfactory equipments are commodious baggage and coat racks, linoleum-covered floors, large saloons, elimination of vibration and noise from doors, partitions, trolley bases, ventilators, and other parts, installation of match scratchers and ticket holders, application of aluminum for baggage racks, coat hooks, seat handles and seat strips, absence of all unnecessary overhead rods and cords and good interior finish.

GAINS FROM LIGHT-WEIGHT CARS

The light-weight cars on the properties considered represent applications which involve the retirement of equipment weighing 30 to 200 per cent more than the new types. Old obsolete motors have been replaced by modern efficient machines that operate economically with low maintenance. In fact, every effort has been made to reduce operating costs with due consideration to the proper balance between service, comfort and economy.

Schedule speeds have been maintained or improved in most cases. In one or two instances the possibilities of high-speed service were not fully considered previous to the selection of equipment, and operation is handicapped by low car speeds. On one property quadruple 35-hp. motors are applied on 39,500-lb. cars, and the result is low speed cars which do not meet the service requirements satisfactorily. A better equipment in this case would be quadruple 40-hp. motors, suitable for high-speed operation.

The principal operating economies that are realized by light-weight car operation occur in maintenance of way and structures, maintenance of equipment, power and conducting transportation. Way and structure maintenance is directly affected by reductions in car weights, but it is difficult to estimate the credit due light-weight equipment or to determine the saving from actual operating costs without a long period of light-weight car operation.

Maintenance of equipment is indirectly affected by car weights in that the cost

of repair parts are less, but the principal savings may be ascribed to the modern designs of car bodies, trucks, motors and control. Weight reductions affect energy consumption directly, and consequently power costs are lower when lighter cars are placed in service. A saving in the conducting transportation account occurs when it is practicable to operate cars with one man and thus reduce the platform labor cost. Fifty per cent of the 38 interurban properties considered operate their new light-weight cars with one man.

A Southern property which is operating new 25,200-lb. one-man cars instead of the cars weighing 65,000 to 70,000 lb. formerly used is saving 49 per cent in the cost of maintenance of equipment, 50 per cent in the cost of power and 46 per cent in the cost of platform labor. Bus competition which developed while the old cars were operating has been entirely eliminated by the improved service, and an operating deficit has been changed to an attractive profit.

A Mid-Western property which has installed a number of 51,000-lb. two-man cars in place of cars weighing 76,000 to 80,000 lb. has reduced its cost of operation from 48 to 34 cents per car mile, a saving of 29 per cent.

FACTORS FOR CONSIDERATION

A summary of the study of the various installations of light-weight cars indicates that there are several essential factors which must receive careful consideration to obtain the most satisfactory equipment:

1. The type of car must be suitable to perform the service requirements of the particular line or system on which it is to operate. The primary factors to be considered are schedules, character of traffic, and possibilities of one-man operation. Comparisons can be made with similar properties operating light-weight cars to assist in the selection.

2. A motor equipment is required with ample speed and capacity and also capable of meeting probable increases in schedule speeds after the new equipment is installed. Possible operation in trains to handle heavy traffic must be considered in determining the type of control equipment.

3. A careful study is necessary of all details of the design, particularly in connection with the car body so that every feature which influences the comfort and convenience of passengers will be included. The most successful types of light-weight cars now in service demonstrate the effectiveness of work of this kind on the part of operators.

Southwestern Association Meets at Houston May 5-8

THE convention of the Southwestern Public Service Association will be held at Houston, Tex., May 5-8.

This is a change from May 19-22, the dates which were formerly announced. Headquarters will be at the Rice Hotel, and reservations will be handled by the hotel management. W. E. Wood, Houston Electric Company, is chairman of the general convention committee.

American Association News

Mr. Shannahan Sees the Industry Healthy

A. E. R. A. President in Statement to the Press Reviews Progress of the Past Year—Traffic Trend Is Upward—Co-ordination of Electric Lines and Buses Encouraging

SINCE early last fall the traffic trend on electric railways has been definitely upward and the total business for the year will almost duplicate that of 1923, which set records for all time. This is the gist of the annual statement of J. N. Shannahan, president of the American Electric Railway Association, which was released to the daily newspapers Jan. 22. A banner year is predicted for 1925. The statement follows virtually in full:

STATEMENT OF PRESIDENT SHANNAHAN

Electric railways generally throughout the United States held their own during 1924. In the face of severe industrial depression early in the year, which in some communities decreased traffic 10 per cent, and an increase of 2,065,590 pleasure automobiles the record is remarkable. Final figures for the year indicate total passengers carried will be within 2 per cent of the 16,000,000,000 total for 1923, which set an all-time record.

City lines are recovering passenger business more steadily than interurbans. Substantial progress is being made, however, by many interurbans through freight business. Others are finding introduction of extra chair and dining car service and special excursion rates helpful.

The foregoing reflects only the general trend. There are both city and interurban properties, of course, which are experiencing extreme difficulties.

Today the traffic trend on electric railways is upward, as, indeed, it has been since early last fall, and indications for a banner year during 1925 are good. This because the electric railway curve invariably follows the general business trend, and it is agreed that unless the unforeseen happens business in all lines will be good.

Perhaps the most encouraging feature of the electric railway business today is the gradual but definite co-ordination of electric lines and buses. Very steadily electric railway managements throughout the country are assuming control of all local transportation, including both rail and motor lines, and co-ordinating it under one head. At the beginning of 1924 only 100 electric railway companies were operating a total of 1,000 buses in conjunction with their rail lines, but today there are 2,500 buses, owned by 170 different electric railway companies, in the field.

The bus is fitting into two distinct places. The first is in the extension of passenger service into suburban territories whose traffic does not warrant the extension of rail lines. The second

is in supplementing established rail service.

These are the two logical fields for the bus, and all far-seeing transportation men realize it. The cry that the bus was about to supplant electric lines generally no longer is raised seriously by any one thoroughly familiar with the experiences of American and European cities. Of course the bus has replaced a few car lines in smaller communities—lines many of which probably never should have been built—but nowhere have they succeeded in supplying entire cities of any size with complete transportation.

Far-seeing electric railway executives everywhere are supplementing their rail service with buses where traffic warrants such action and enlightened public officials and citizens are co-operating with them in an endeavor to establish the best possible car-bus services. Under this new understanding the wildcat bus and jitney is rapidly disappearing through local and state legislation.

The pleasure automobile today is a far more serious competitor of electric railways than buses. How far they will go in competing against established transportation lines through giving "free lifts" at the risk of imperiling service remains to be seen.

ELECTRIC RAILWAYS NOW ON A SOUND BASIS

Underlying conditions with the electric lines are sound, as evidenced by the way the industry withstood the serious depression of the early part of the year. Although many industrial plants throughout the country either were closed down completely or in part, thus cutting into the regular car riders represented among office and factory workers, the operating ratio on the lines remained good. An increase of only two points, from 73.75 to 75.75, is shown. An increase of only 1 per cent is shown in operating costs, although wages alone were up 2 per cent. There were 65 wage increases, 13 decreases and 60 renewals without change.

Fares also increased during the year and exhibited a responsiveness to operating conditions, indicating anew that the old fixed fare idea has been eliminated. The average cash fare in cities of 25,000 population and over increased from 7.31 in January, 1924, to 7.49 in January, 1925, or about 2½ per cent. The January, 1925, figure represents a new peak in electric railway figures, the highest previous point in the average cash fare being 7.46, reached in November, 1921.

Another evidence of the healthy condition of the industry is the record of receiverships. Despite the fact that business depression and subnormal traffic conditions prevailed throughout the greater part of the year, only 13 street railways went into the hands of receivers, representing 1,022 miles of track and with outstanding securities of \$75,000,000. Twenty-two companies, representing 1,650 miles of track and \$176,000,000 of securities, were discharged from their financial difficulties.

A total of 312 miles of new track was constructed in 1924, being the largest single year's construction since 1918, and 712 miles of track was reconstructed. Total bus-mile extensions amounted to 2,870 miles, making an increase of more than 3,000 miles of service added by the electric railway companies during the year.

Abandonments amounted to 225 miles. No single abandonment, however, amounted to more than 29 miles, and the average for the 23 companies affected was slightly less than 10 miles each.

A survey made by the ELECTRIC RAILWAY JOURNAL indicates that \$342,000,000 will be spent in 1925 by electric railways for new plant and equipment, maintenance, material and supplies. This total represents an increase of 30 per cent over the amount spent for similar purposes in 1924. A total of \$75,700,000 will be spent for way and structures, \$103,400,000 for rolling stock and equipment and \$32,400,000 for power facilities. The balance will go for material, supplies and maintenance. These expenditures are exclusive of labor costs.

Wood Preservation

A MEETING of the committee on wood preservation of the Engineering Association was held at Association Headquarters, New York, on Jan. 20. Those present were A. P. Way, chairman; M. J. Curtin, J. L. Fritsch, W. L. Harwood, C. A. Smith, L. P. Scanlan and R. C. Cram, sponsor.

The work of the committee for the ensuing year was laid out. The assignments of the various sub-committees and their membership follow, the first name in each case being that of the chairman:

1. Review of existing standards. Messrs. Fulweiler, Hartman and Woods.
2. Open tank treatment of wood poles. Messrs. Fritsch, Hartman, Harwood, Morier and Scanlan.
3. Brush treatment of wood poles. Messrs. Hartman, Harwood, Smith and Woods.
4. Pressure treatment for wood poles. Messrs. Curtin, Fritsch, Woods and Scanlan.
5. Increasing life by methods other than the use of timber preservatives. Messrs. Harwood, Fritsch, Hartman and Scanlan.
6. Use of other preservatives than creosote. Messrs. Smith, Curtin, Fulweiler and Morier.
7. Forms and methods for keeping continuous records on performance of treated timber. Messrs. Morier, Curtin, Fulweiler and Smith.

Maintenance of Equipment

Motorized Equipment Reduces Track Maintenance Costs

Welders and Compressors Mounted on Rebuilt Ford Trucks Are Readily Moved Between Jobs—Rubber-Tired Mounting Reduces the Repairs to Apparatus

FOR the purpose of increasing the mobility of track equipment and at the same time reducing its maintenance cost the Denver Tramway has adopted the practice of mounting such apparatus on 1-ton Ford trucks. Each of these units is self-contained and no trailers are hauled. The equipment is run into the shop at night, where it is under cover and easily fixed when repairs are necessary.

It has been found possible to buy second-hand Ford trucks in fairly good shape at exceptionally low prices. With very little overhauling these trucks are put into condition which makes them suitable for track maintenance work. The average price of trucks thus purchased was approximately \$85.

The welding truck, shown in an accompanying illustration, is a good example of this type of equipment. It carries a crew of three men and has two welding heads. A light body is used to house the equipment, having substantial corner posts and a permanent top. Rolled curtains on the sides protect the equipment in inclement weather. The welding cables are carried on reels mounted under the top, so that they readily may be

paid out to considerable distances on the track. Signs directing traffic and warning passers-by to avoid watching the arc, as well as shields to set up around the actual welding work, are carried in convenient racks built over the running board at one side of the body. On the opposite side a pair of brackets is arranged to carry the poles for connecting the welder to the trolley.

This equipment is used for welding bonds and also for building up cupped joints. On the latter class of work an Atlas grinder is used to smooth off the surface of the rail after welding.

Formerly six men were required in a repair crew because ordinarily one grinder can do the work after two welders. By using two heads on this welding equipment as mounted in the truck, four men do the work formerly requiring six. This crew consists of one grinder, two welders and one common helper. The grinder is hauled out with the welding truck, thus making the most efficient use of the equipment.

A similar piece of track maintenance equipment mounted on a Ford truck is shown in a second illustration. This consists of an Ingersoll-

Rand type 14 compressor, which has sufficient capacity to handle four tie tampers or four concrete breakers at one time. In joint repair or similar maintenance work it has been found extremely convenient and, like the welding equipment, its mobility is a decided advantage.

As shown in the illustration, the body for this compressor truck is provided with removable metal sides so that when set up in operation these sides may be removed to expose the compressor for oiling or other operating attention. The compressor is motor driven from the trolley. Compressed air tanks are mounted vertically near the back of the body, and a circuit breaker for protection of the motor is installed in a small control cabinet at one side of the tank. A large tool box is mounted on an extension of the chassis at the rear.

For concrete repair work, a portable boiler is used to furnish warm water. This is required for a large part of the work in Denver, since the nights are cold. The boiler is mounted on a trailer so that it may be hauled out to the job behind one of the Ford trucks just described.

Railway Builds Heavy Tower Truck

TO TAKE care of heavy overhead construction work the Middlesex & Boston Street Railway, Newtonville, Mass., purchased a 2-ton White truck and built a body and tower on this



A Motor-Driven Compressor Mounted on a Ford Truck Chassis Will Handle Four Tie Tampers or Concrete Breakers



A Crew of Four Men with This Portable Welding Outfit Can Do the Work of Six



A Permanently Inclosed Body Is a Feature of This Heavy Tower Truck

chassis. The work was done at the Waltham shops of the railway. The body is of oak, while the sheathing on the sides and top is pine covered with canvas. This tower truck is similar in general design to one built some time ago by the same company, and described in *ELECTRIC RAILWAY JOURNAL* for Aug. 12. The new vehicle, however, is heavier and better adapted for doing work where extensive reconstruction of the overhead is involved. The crew consists of six men, a foreman, a driver, and four linemen.

Poles Set with A-Frame Derrick

AN A-FRAME derrick attached to an extension of the truck frame of a standard tower truck for setting iron and wooden poles has been used during the past 4 years by the Omaha & Council Bluffs Street Railway, Omaha, Neb. A 2½-ton Gary truck with power take-off is used. When raised, the sheave is about 15 ft. above the ground. Power is transmitted through a set of gearing with three speeds ahead and one reverse. This transmission drives a 5,000-lb. Bay City winch, which is located back of the tower. A length of 600 ft. of ¾-in. hoisting cable is used for the winch. The cable is carried from the winch up over the sheave on the A-frame and then to the pole to be raised. One man operates the control levers and another steers the pole into the hole. When not in use, this A-frame is removed from the truck by taking out two

bolts. When 35-ft. poles are to be set, an additional 5-ft. piece is added between the truck and the bottom of the short A-frame.

With this addition to the company's standard line truck, the cost of setting poles has been cut to half and the cost for removing iron poles to about one-fourth of the former cost where a gin pole was used. An additional saving has also resulted when removing iron poles by lifting out the concrete base intact without loosening it from the iron pole. The pole is then ready to be set in another location without much work. The poles to be set are hauled on a 2½-ton trailer behind the line truck. The trailer is uncoupled when the job is reached.

Motorman's Valve Worked In by Machine

BY O. R. HOTT

Columbus Railway, Power & Light Company, Columbus, Ohio

AMOTORMAN often complains that a recently overhauled air valve works hard, due to the newness of the seat and the close fit of the valve stem. To work in new valves an apparatus is used in the car repair shops of the Columbus Railway, Power & Light Company. This operation duplicates the wearing-in process which would require several days actual use by a motorman.

As shown in the illustration, a ½-hp., 500-volt d.c. motor drives, through worm gearing, a crank which in turn operates the valve. After the valve has been lapped in by hand, it is assembled on a valve support on the bench and connected to the shop air line in the same manner as on the car. The special motorman's valve handle used has a connecting rod, the other end of which is fastened to a crank pin of the propelling mechanism. Both ends of the connecting rod have ball and socket joints. The stroke of the connecting rod is such that the valve is oscillated back and forth 120 times per minute through the usual operating arc. Working in a valve takes from 15 to 30 minutes, depending upon its tightness at the start.

This entire outfit was made in the shops from materials at hand. The reduction gearing and crank were designed and built in the shop, while the connecting rod is a portion of a



An Apparatus Which Gives the Motorman's Valve the Proper Freedom of Movement Before It Leaves the Shop

Ford automobile steering gear. Since this mechanism has been used motor-men have experienced no trouble from sticking valves.

New Equipment Available

Safety Switch

SEVERAL improvements have been made in a design of safety switch manufactured by the Consolidated Car Heating Company, Albany, N. Y. The switch box is arranged to contain the fuse for car heater circuits. By opening the cover the switch is automatically opened so that there is no danger of a person touching live parts while replac-



Safety Switch for Car Heater Circuits. The Cover Is Shown Raised to Permit Fuse Replacement

ing a fuse. The switch is mounted in a steel box 6 in. x 12 in. x 4 in. deep. The lower part of the cover is hinged so as to provide for replacement of fuses. For ordinary operations of opening and closing the switch an arm projects through the cover and the two positions are lettered so as to indicate "On" and "Off." Opening the cover automatically shifts the handle to the off position, so that a fuse cannot be removed with current on.

Improvements in construction include contacts mounted in molded insulation and an arc chute with blow-out coil. The contact tips can be replaced and screws can be taken out from the front.

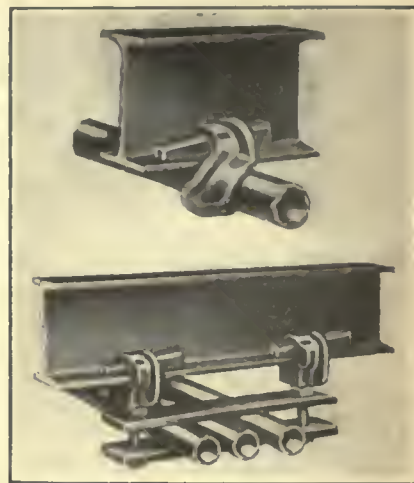
Copper Bearing Steel Poles

OF THE substitutes for wood poles which have been tried, those made of steel have many advantages and no doubt would have superseded wood but for their high first cost, when compared with wood, and lack of dependability due to danger of damage by corrosion. Up to the present, galvanizing has been the only method tried to prevent corrosion, but this adds greatly to the cost. Recently the Truseon Steel Company, Youngstown, Ohio, put on the market a steel pole fabricated from copper-bearing steel which contains new features in design tending greatly to reduce manufacturing costs.

The mechanical construction of the pole was described in the June 21, 1924, issue of ELECTRIC RAILWAY JOURNAL. It consists of two structural steel channels, each with the center portion of the web sheared and pressed out normal to the web. The pressed out sections have a triangular shape and when riveted together a latticed tapered pole is formed.

Hangers for Clamping Pipes to Framework

A LINE of pipe hangers for clamping conduit or pipe to structural shapes is being marketed under the trade name of "Wedgtipe" by the Crouse-Hinds Company, Syracuse, N. Y. These pipe hangers allow pipe or conduit to be clamped to supporting members where the flange is not less than $\frac{1}{8}$ in. at the edge and not more than $\frac{3}{8}$ in. thick at a distance $\frac{3}{4}$ in. from the edge. They are particularly convenient for fastening conduit to the underframing of car bodies. Each hanger consists of two pieces, a hook and a wedge. The hook fastens under-

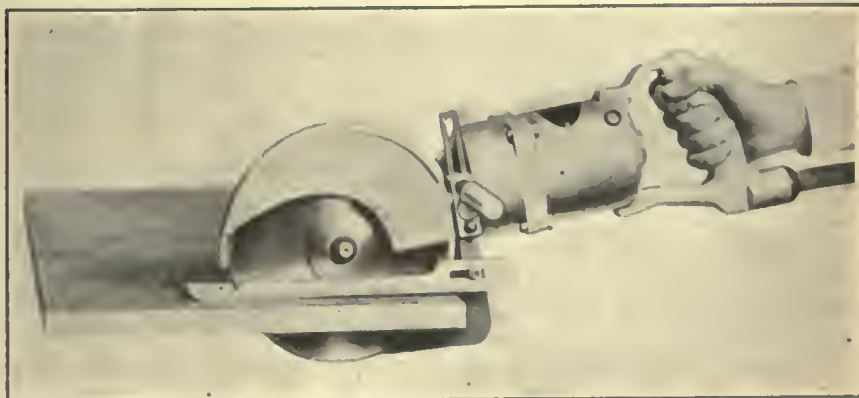


New Hangers Used to Clamp Single Pipe to I-Beam and Also Several Pipes by Means of Cleats

neath the pipe or conduit and the wedge provides the clamping action when driven into place. The wedge has serrated surfaces at both top and bottom, so that when driven into position, there is no danger of its working loose through vibration.

Electric Circular Saw

A PORTABLE type circular saw which is electrically driven is being marketed by the Michel Electric Hand Saw Company, Chicago, Ill., under the trade name of "Skilsaw." This can be used for cutting lumber up to 2 in. thickness. By means of a special cutter furnished with the saw other building materials can be cut. The body of the saw is made of No. 12 sheet aluminum, so as to keep down the weight of the tool. The electric motor for driving the saw is of the universal type and can be furnished in sizes for use on either 110 or 220 volts, a.c. or d.c. The motor is air cooled by forced ventilation. The control is by a contact trigger switch on which the operator's finger must be held to keep the motor running.



Cutting a Board with the Portable Electric Circular Saw

The News of the Industry

Chicago Bankers Insistent

If Municipalization Scheme Is to Go Through, Security Holders Must Be Accorded Protection

A new tone of militancy has entered the Chicago traction negotiations. With all parties in the municipalization program holding in steam nearly to the bursting point, something like an explosion seemed imminent. The tenseness was created by the statement of Silas Strawn, attorney for the bankers holding Chicago Surface Lines securities, that the city could not get control of the lines until the last cent had been paid. An election in February impends.

"Do you mean to say that when we have paid in 90 per cent we will still have 30 per cent control?" shouted an Alderman when Mr. Strawn made known the bankers' insistence on those terms.

"Not if you had anything but stage money to pay us," retorted Mr. Strawn ironically.

"We won't stand for it," broke in Chairman U. S. Schwartz, who conducts most of the city's negotiations. "We'll kill the whole deal."

This was only one of several stormy incidents, but it was the major development of the negotiations of the city of Chicago to create a city-owned transportation system to cost upward of \$500,000,000. The upshot was that Mayor Dever backed up Mr. Schwartz and issued a veiled threat to the Surface Lines securities holders.

"The bankers are mistaken if they think the city powerless," said the Mayor. "And if they think that because we are on top of the elections we haven't another program for just this contingency, they are due for some information."

"They can take this as an ultimatum: co-operate or we will step out with another plan at once. The air has been cleared and I am not discouraged. If they want a settlement they can have it, but they will have to come to us now."

The contested section is one providing for tripartite control of the lines until the city pays off all the so-called Schwartz certificates, which are the notes to which Mr. Strawn referred as "stage money." The city will have outright dictation over three of the nine members of the operating board and it has been the intention of Mayor Dever's advisers to have him take over the appointment of additional members in proportion to the amount of indebtedness paid off.

Committee members then asked Mr. Strawn to try another plan on the bankers.

"I am not smart enough to devise a substitute," he said in reply. "The bankers feel that their obligation to the last certificate holder is as great as to

the first one paid off. They will not recede."

A poll of the committee on the question of acquisition of control in proportion to retirement of the city's notes brought a dissent from Alderman Guy Guernsey, one of the foremost members of Council. Pressed for a reason, he retorted:

"I care too much for this plant to let a Council run it. I am concerned about our transportation not so much during

the period of payment while private traction men have control as for the ten years that follow."

Alderman Fick, calling the traction plan a 50-year franchise for the Surface Lines, recalled the day when he entered the chamber to vote on a Yerkes 50-year franchise.

"Nooses dangled from the gallery and there were bombs on the floor," he said. "The franchise got 12 or 13 votes."

Divided Report on Boston Elevated

Wide Conflict of Opinion Among Members of Special Legislative Committee—Bare Majority Seeks Delay—Minority Would Extend Public Control Twenty Years—Battle in the Legislature Expected

TWO separate and distinct reports were filed on Jan. 17 with the Legislature of Massachusetts by the joint special committee of that body created to investigate the question of control, finances and equipment of the Boston Elevated Railway and to consider and report on the advisability of establishing a transportation district for the financing of metropolitan rapid transit. The membership is widely divided on questions of policy and in its conclusions. There is a majority report signed by five out of the nine members, headed by House Chairman Henry L. Shattuck, and a minority report signed by four other members, headed by Senate Chairman Charles C. Warren.

At the outset of the committee's investigation the public trustees of the Elevated presented a statement of capital needs calling for an expenditure of approximately \$20,000,000 in the next 10 years, at the same time calling attention to the company's inability to provide the necessary capital without Legislative aid.

The majority in their conclusions state that the several questions presented in the order creating the committee are so interrelated that new capital should wait upon a further study of the termination or extension of public control, complete public ownership and the question of the creation of a transportation district. The majority state that while they are aware that many of the improvements which the Elevated desires are desirable and should be made in the near future, raising new capital for the purpose of making these improvements is so involved with the other questions that further study should be made of the whole problem; and a resolve is submitted providing for a further investigation.

The minority are in accord with the majority in its recommendation for a further study of the formation of a metropolitan transportation district, but is opposed to the remainder of the

conclusions and recommends that the present General Court extend public control for 20 years. An extension of public control for this period, they believe, will be ample to allow the Elevated to finance itself. They take the position that the road must not be hampered nor obstructed in its progress and operation. New capital is needed and should be provided without delay. The greatest obstacle in the way of the company's obtaining new capital is the uncertainty as to the future, and the minority recommend the 20-year extension, confidently believing that it will furnish the necessary relief. They also present a bill providing for an extension of public control for the period mentioned.

In brief, the majority committee has concluded that there are a number of desirable improvements for which capital should be available within the not remote future. The method by which such needed capital is to be raised, if a far-sighted plan is to be adopted, involves at one and the same time the questions of termination, modification or extension of public control, of complete public ownership or further steps toward public ownership, and of the creation of a transportation district.

These questions, the majority committee says, are interrelated and inseparable. They involve problems of great complexity and of the highest statecraft. No decision concerning public control should be made without the fullest examination, from every angle, of complete public ownership and of further steps toward public ownership; and no decision on either public control or public ownership should be made without the most careful consideration of the need for a transportation district and of the powers, duties and political structure and control of such district if created. The committee believes that it would be most unwise to attempt to pass on any one of the questions without the fullest study and

consideration of all. The majority of the committee said in part:

If the fixed term of public control is extended, various amendments to the public control act should be made, and if a transportation district is established to take over the control of the Elevated system and provide for the ownership, construction and financing of rapid transit lines, the public control act must be so revised as to make it fit the district plan. In carrying out any such changes, and in the financing of any capital expenditures which may be required, the stockholders of the Elevated should give their hearty cooperation.

No plans for raising capital in any considerable amount on satisfactory terms pending further study of these questions as a whole have been suggested to the committee except such as might greatly hamper, if not hamstringing, a wise, long-range solution of these questions. The committee, therefore, looks with disfavor on the adoption of any palliative which in no way strikes at the root of the difficulty.

The proposal that the fixed term of public control be extended for 20 years, if adopted, would give no assurance that new capital could be raised through the sale of Elevated stock.

PUBLIC CONTROL CONTINUES

The principal advantage, so far as the public is concerned, of extending the fixed term of public control beyond 1928 is to enable the company to raise new capital at reasonable rates.

If this object is not attained, the principal argument for an extension of the fixed term falls. Before making any extension of this fixed term we should be very sure that such extension will make possible the accomplishment of this object. As previously stated, there is no such assurance.

Furthermore, if the 20-year extension were granted and the question of establishing a metropolitan transportation district were postponed, it might be much more difficult, if not impossible, to obtain the required assent of the Elevated stockholders to such changes in the public control act as might prove advisable in connection with the establishment of the district.

Another objection to rushing into any extension of public control is that certain plans have been submitted to the committee for financing capital needs without any extension of public control. These plans should be further studied before any final commitment is made on this question.

RECOMMENDS FURTHER STUDY

For the reasons stated above, the only recommendation which the committee makes at this time is that these questions of public control, public ownership and transportation district be further studied.

The committee believes that no vital public needs will be imperilled by the delay caused by further study.

More important at the moment than new capital is the balancing of the budget. That must come before any considerable capital expenditure can be thought of.

As previously pointed out, there has been a great change since July, 1923. Then receipts were running at the rate of more than \$1,000,000 a year above expenses, and the margin of receipts over expenditures was increasing.

In October, 1923, came a wage award which increased annual expenses by about \$1,800,000, and the year ended June 30, 1924, closed with an operating deficit of \$144,202, which was wiped out only by a fortunate settlement of old claims. Since then every month from July to October has shown a deficit, and in October, 1924, came another wage award, increasing the annual wage expense by about \$500,000 more.

Following this, the 5-cent fare went by the board. No one knows now whether fares must be increased to meet expenses. No one knows whether wages will be lower or higher this year. Much depends upon the wage settlement to be made for the year beginning July 1, 1925. The committee repeats that the question of revenue and expense is the question of the hour. Further capital expenditures must and can wait.

The minority of the committee agrees with the majority in its recommendation for a further study of the formation of a transportation district, but opposes the remainder of the conclusions. It undertakes as briefly as possible to set out its reasons why it believes it is necessary that the questions of continuance or discontinuance of public control, the needs of the road for additions and improvements, and

the financing of the same, are subjects that should be presented to this session of the General Court for discussion and debate, and an opportunity be then given to remove the uncertainty that surrounds the future of the company. The minority report said in part:

When the trustees came before the committee at the first public hearing and presented a statement of their requirements, they filed with it a schedule of plant improvements, the construction of which was to cover a period of 10 years and was estimated to cost \$20,000,000.

Whether every item listed in said schedule is imperative we do not undertake to say, but from our investigation of the plant made by visiting and examining places where improvements were contemplated, it was obvious that many are needed, and that some should be made in the near future in the interest of economy of operation.

The law puts restrictions on the sale of Elevated stock. It does not allow the issue of that stock at less than par, and the common stock of the company, under present conditions, has lately been selling in the market around 76 and the 7 per cent preferred at 94, so it is clear that raising capital by this method is out of the question. It does not seem advisable for the trustees to issue stock bearing 8 per cent dividends, as they have authority to do, as this would place an unfair burden on the car rider.

Under the present law the trustees may issue notes that are made payable not more than 12 months from date of issue, but special legislation would be necessary to enable them to issue notes for a longer period. The trustees have already borrowed on short time notes the sum of \$5,200,000, and believe they have approached the limit with notes of this character; to borrow further on short-time securities would, in their opinion, seriously affect the general credit of the company. As obtaining capital by the sale of stock is impossible, and an issue of bonds or short-time notes inadvisable, how, then, are the trustees to get capital to the amount recommended?

PUBLIC CONTROL A SUCCESS

Public control has been in operation sufficiently long to impress the public with its practical success. Those who appeared and spoke at the public hearings of the committee were practically unanimous in recommending a continuance of public management. All were agreed that the affairs of the road had been administered by the public trustees in an economical and business-like manner. Its efficiency has been restored, and satisfaction with the service rendered prevails to a greater extent today than for some time past.

With the possible end of public control so near and that fact well known and recognized, uncertainty prevails. This is having a marked effect upon the development and expansion of the company. The price of the common stock on the market is a strong reminder of the present situation and a true indication of how uncertainty will affect the standing of a large corporation.

The trustees are fully alive to this state of affairs and have convinced us of the necessity of removing as soon as possible this state of doubt, so that the credit of the company will not continue to be adversely affected.

We, therefore, recommend that the act be extended for a further period of 20 years, together with amendments that are advisable, and submit an act. We believe an extension for that period will provide such assurance as to the future of the road as will enable it to finance itself. Such an extension will also afford reasonable permanency and permit broad plans for development over a period of years.

We further point out in support of our position that the trustees have already been delayed over one session of the Legislature, having first presented their needs at the session of 1924, and if they are now compelled to wait further study and a report upon all the questions in the order, any action in their behalf will be delayed until the session of 1926.

It is not at all clear that if the formation of a transportation district is further studied and recommended that it will ever be established. It may appear that the towns and cities adjacent to Boston are not yet ready to become united in a plan of this kind. The fact that a metropolitan transportation district may be established at some future time does not justify delaying action as to the extension of public control. In any event, with the future so uncertain as to a district and the needs of the Elevated so apparent, further delay

would be a mistake. The public control act directs the trustees to maintain the property "in good operating condition and to make such provision for depreciation, obsolescence and rehabilitation that upon the expiration of the period of public management and operation the property shall be in good operating condition."

We therefore reiterate that improvements should be permitted and capital provided, and that this Legislature at the present session should extend such assistance to the road as will enable the trustees to maintain the railway in such operating condition that it can render efficient service to the public at a minimum cost.

Injunction to Stop New York City's Bus Program

The Board of Estimate of New York on Jan. 19 appropriated \$135,000 for buses with which to equip a city-operated line on Eighty-sixth Street. Twenty buses were to be purchased. Commissioner Mills of the Department of Plant and Structures anticipated a profit of \$100,000 a year. The line was to be established on the assumption that Comptroller Craig is right in saying that the city has power to operate buses under the home rule amendment passed by the Legislature at its last session. This assumption was challenged a few hours after the appropriation had been made by Leonard M. Wallstein, acting for the Citizens' Union. He secured a temporary injunction against the disbursement of the \$135,000. It has been Mayor Hylan's contention that additional legislation was needed for the city to enter upon its own bus program, but Mr. Craig has stuck stoutly to the contention that the city already had powers sufficient to permit it to proceed. The Mayor finally capitulated.

Dallas in Throes of Fare Difficulties

The City Commission of Dallas, Tex., recently granted the Dallas Railway a second extension of the 6-cent fare for 30 days ending Feb. 10. The first extension was granted Dec. 27 for 15 days. In line with the 6-cent fare extension the company will be expected to carry out improvements suggested in the amended Everman Plan No. 3, soon to be drafted by the city attorney. The plan provides for \$243,000 in betterments to the system in return for being permitted to charge a 6-cent fare for another 18 months. The amendment includes the rebuilding of 25 cars. At the same time Supervisor Everman has left the way open to negotiations eventually to remove the time limit on the 6-cent fare.

A spokesman for the City Commission explained that this would be done by an alteration in the phraseology in the ordinance giving legal effect to Everman Plan No. 3. It reads: "At the conclusion of 18 months the fare will automatically revert to 5 cents." The alteration will be to this effect: "At the conclusion of 18 months the fare will continue at 6 cents unless otherwise ordered by the City Commission."

It was said that this proposed change would place the Dallas Railway in position to borrow or float bonds to the sum of \$1,000,000 of new money to be placed in the properties.

This development, however, can not take place unless the State Supreme

Court at Austin decides the Geller suit favorably toward the traction company and the city. This suit, filed by F. J. Geller of Dallas, questions the right of the City Commission to grant a 6-cent fare when the franchises of 1917 specify 5 cents. Until this suit is adjudged, the traction company is not in a position to borrow money, officials testified at the public hearings.

Under the terms of the franchises when the reserves are refilled, the \$900,000 of improvements made in the past under Everman Plans Nos. 1 and 2 will be added to the property value of the company. At present the company is permitted to earn 7 per cent on a property value of \$9,500,000. With the improvements admitted to property value the company will be permitted to earn 7 per cent on \$10,400,000. It was brought out in the hearings that the gross revenues of the company have remained the same for the last 3 years in spite of the improvements. It is not estimated that they will increase next year. On that basis it is feared that with more money going to pay the authorized return less money will be in the surplus for improvements.

Talk of Railway Buses at Worcester

Whether or not the Worcester Consolidated Street Railway, Worcester, Mass., operates buses in the near future is reported to depend largely upon what the 1925 Massachusetts Legislature does regarding the enactment of laws intended to control the use of these vehicles. Officials of the railway are said to believe that in some of the outlying sections which the railway covers the buses could be operated more economically than trolley cars. The present laws do not cover certain points regarding transportation by bus which the Consolidated officials want to see cleared up before they consider the operation of buses.

Charter Sought for Subsidiary Bus Company in Pittsburgh

Application has been made for a charter for the Pittsburgh Motor Coach Company, which will be affiliated with the Pittsburgh Railways, or more properly the Philadelphia Company. The proposed incorporation of the new company is regarded as the first steps toward establishing a network of bus lines in Pittsburgh and other parts of Allegheny County.

In the charter application, two proposed routes are specified. One of the routes proposed is the so-called Squirrel Hill route, along the Boulevard of the Allies, through Squirrel Hill and to Thomas boulevard in Homewood. The other is the route from Butler and Fortieth Streets across the Washington Crossing bridge to Millvale.

After the initial routes are established, the present plans include the gradual extension of route establishments until those points in the city and suburbs not covered by street cars are furnished transportation. Activities outside of Allegheny County, in which Pittsburgh is located, are not likely to be projected for some time to come.

What Would You Do?

WEATHER like that of Friday and Saturday is enough to try the patience of most folk, and nowhere more than on the street cars can there be found evidences of the varying reaction upon the human animal of the delays and inconveniences to transit. "Rotten service" is perhaps the first and most natural verdict of the average man or woman who stands in the slush waiting for the car that does not come or, worse yet, stands in impotent rage when it runs past without stopping. And the same conclusion is often reached by the more fortunate one who, once inside the car of his choice, is compelled to stand in a space far too small and await seemingly indefinite hours while stalled automobiles and trucks are dug out of the drifts.

It is not wonderful that patience breaks under the strain, but it is peculiarly a time for philosophical endurance and for that give-and-take without which intercourse with our kind would often be intolerable. Car conductors and motormen are only human, and if they sometimes lose their tempers, if they run by when they ought to stop, if the side door is closed to waiting and shivering folk on the corners and if the trip to business or home again takes two or three times the normal period, it is unfair to put all the blame on "the service." Impolite or tactless carmen can be admonished or disciplined, but the weather we have to take as it comes. And the narrow streets and their increasing use by wheeled vehicles cannot be remedied or checked by cussing at them or at the transit company. If the fellow who damns the "rotten service" would only consider what he would do on days like Friday or Saturday to make it better, perhaps he would realize that there are limits beyond which executive management cannot hope to go and that rain and snow and ice, like time and tide, wait for no man.

Editorial from Philadelphia Public Ledger, Jan. 5, 1925.

Seeks Amendment of Syracuse Franchise

The New York State Railways, seeking to abandon its railway line in Grape Street and establish bus service in its place, is to ask amendment to its franchise covering the route. The move is sought by the city in an effort to relieve congestion in the downtown section of the city. The company has never before sought to replace trolleys with buses. The bus routes have all been in sections where the railway did not hold franchises. These lines are operated under special bus permits.

The company fears that if it established buses on the Grape Street line under permit the provisions of its franchise would become void. It wishes to

hold the franchise for the streets traversed and at the same time operate buses.

Alabama Decision Protects Railways

The Alabama Public Service Commission has ordered a number of jitney operators at Huntsville and Gadsden, Ala., to discontinue service until they have complied with state regulations. By this ruling the state commission lays down a precedent that railway service must be protected. The commission held that jitneys are a public utility and as such are subject to the rulings of the commission. It was the opinion of the commission, however, that cities having utilities should adopt their own jitney regulations. The action of Birmingham in forbidding the use of jitneys was cited as an example of the success of city regulation.

Hopes of Service Resumption Blasted in Marietta

All hopes of an immediate resumption of railway service between Marietta and Atlanta, Ga., were blasted on Jan. 16. That day, after an agreement had been reached between the officials of the Georgia Railway & Power Company and a group of Marietta citizens that the service should be resumed Jan. 17 and the City Council of Marietta had passed an ordinance forbidding the operation of jitneys on its streets, Judge Morris of Marietta, representing a number of bus lines, filed suit in the Fulton Superior Court asking a receivership for the railway. Filing of the suit caused railway officials to abandon the agreement reached at the conference and wrecked all hopes of an immediate resumption of service.

The petition filed by Judge Morris seeks the following things:

That any and all patrons of the said road who may so desire be permitted by order of this court to intervene and be made parties to this cause.

That the defendant, its agents and employees be enjoined from at any time in the future disconnecting or dismantling any of the tracks, electric lines or other properties of the said defendant which are necessary for the operation of the road.

That a temporary receiver or receivers be appointed instantly by this honorable court, with direction and authority immediately to begin the operation of the said road as it was operated up until Jan. 14, 1925; that the defendant, its officers, agents and employees be ordered and directed to turn over and deliver to said receiver all of the physical properties of the Atlanta Northern Railway, and that the conductors, motormen, agents and other employees of the company who were engaged in the operation of said cars immediately prior to the time the defendant ceased the operation of the same be ordered and directed by this honorable court to operate the said cars under the direction of the receivers appointed by the court.

That on the final hearing of this cause the said receivership be made permanent unless the defendant, through its properly constituted officers, agree to continue the operation of the said railroad in the manner in which it was being operated prior to the time it ceased operations or until it, in the manner prescribed by the laws of the state, be duly authorized to cease the operations.

That on the final hearing of the cause the defendant, its officers, agents and employees be permanently enjoined and restrained from at any time in the future, in any manner, dismantling or disconnecting any of the physical properties of the said railroad or ceasing the operation thereof until authorized to do so in the manner prescribed by the laws of the state.

That the petitioner have such and further relief as the court may deem right and proper in the premises.

New Co-ordination Scheme to Meet Financial Emergency

An electric railway that was profitable three months of the year and unprofitable the other nine months has turned the bus to its advantage. About 6 months ago the Newport Electric Corporation, Newport, R. I., operating the road in question, made plans to supplant the railway service nine months of the year with buses and to operate both the electric railway and the buses during the three summer months in order to take care of the peak business. In other words, the electric railway service with the shops, etc., would be closed down approximately nine months of the year or until the congestion of the highways should bring about the use of the electric railway.

In order to do this the company secured a certificate of necessity and convenience from the Public Utilities Commission of Rhode Island. Before the railway could secure delivery of its buses, however, an independent operator established service. The Newport Electric Corporation secured an injunction and stopped this service. It is now giving the service itself. The court proceedings of this case were used as a basis for similar action on the part of the New York, New Haven & Hartford Railroad and the Boston & Maine Railroad in their efforts to restrain the operation of bus services which they regard as particularly unfair. As indicated previously in the *ELECTRIC RAILWAY JOURNAL* preliminary injunctions restraining seven bus lines from continuing operations have been granted by Judge Chester W. Barrows in the Superior Court at Providence on petition of the United Electric Railways and the New York, New Haven & Hartford Railroad. The case of the New Haven road against the Interstate Buses Corporation has been removed to the United States District Court.

The electric railway department of the Newport Electric Corporation consists of 22.39 miles of track, using 62 cars, in the city of Newport and the towns of Middletown, Portsmouth and Tiverton, and an interurban line from Newport to Fall River, Mass.

Duplication of Service Voted Down in New York

The Public Service Commission on Jan. 5 denied the application of the Bee Line, Inc., for permission to operate a bus line from the New York City line at Rosedale to the village of Freeport. The petition was opposed by the receivers of the New York & Long Island Traction Company, who produced figures in evidence showing that during 10 days of operation of the bus line in August and September there was a considerable falling off in receipts of the railroad. The investment of the New York & Long Island Traction Company from Freeport to Jamaica Junction was testified to be at least \$300,000, and the company is now in position to continue operations and effect betterments out of its income if not deprived of operating revenue. A reorganization of the company for further financing and betterments is expected to take place shortly. The com-

mission concludes that if the road and its receivers and the reorganized company do not give proper service a new application for a bus certificate may be proper.

Boston "L" Can Discharge Citizens from Employ

Trustees of the Boston Elevated Railway, Boston, Mass., have the right to discharge employees who are citizens or World War veterans and retain non-citizens. An opinion to this effect has been rendered to the Governor of Massachusetts by Attorney-General Jay R. Benton. The question was put up to the state authorities by Leo M. Harlow, commander of the Massachusetts department of the American Legion. He declared that the Elevated, under its seniority of service rule, was laying off employees who were World War veterans and keeping men who were not citizens. In view of the fact that the Elevated is under public control, Mr. Harlow questioned the right of the trustees to deprive the World War employees of the preference right given similar employees in other branches of the public service. Mr. Benton holds that "the service in which the employees of the company are engaged is not in any branch of the public service and that the statutory provisions giving preference to citizens and veterans in the public service are not appreciable."

Carol, Sweetly Carol

Clinton D. Smith, general manager, and H. O. Allison, commercial manager of the Beaver Valley Traction Company, New Brighton, Pa., promoted the revival of the singing of carols Christmas Eve last year throughout the district of thirteen towns and townships in which the lines are operated. Obtaining the services of Prof. T. Earle Yearsley and Prof. J. Christian Ringwald, Beaver College, the carol singers, numbering 200, were rehearsed, divided into groups and assigned to districts prior to Christmas Eve. After the separate groups had visited a large number of homes where there were "shut-ins" they were assembled into one group and sang at the various hospitals and institutions. Transportation was by street car and by motor coaches, obtained from the Beaver Valley Motor Coach Company, a subsidiary of the traction company.

Recommend 112 Miles of Railway Construction in Maine

An investigating committee recently recommended to the Interstate Commerce Commission the construction of 112 miles of electric railroad in Aroostook County, Maine. The new line, which will be known as the Quebec Extension Railway, will develop Maine's timber region east of the Rocky Mountains, consisting of 1,200,000 acres of virgin timber in northern Maine. The Quebec Extension Railway is controlled by the Aroostook Valley Railroad, which has been in successful operation about 15 years. The cost of the project is estimated at \$4,000,000.

Illinois Central Seeks Increase in Commutation Rates

The commutation lines of the Illinois Central Railroad, now in the midst of a \$26,000,000 electrification program, and three other big railroads spreading fanwise out of the heart of Chicago have taken steps to increase commutation fares 20 per cent, effective as soon as permission can be obtained from the state. The change will affect more than 150,000 passenger trips a day.

The Illinois Central operates 402 suburban trains and carries 87,000 passengers a day. It announces a deficit of \$3,824,116 in 4 years on suburban service without adding any return on property investment and says it could save \$1,000 a day in running expense alone by stopping all its suburban service. The income in the 4 years was about \$10,000,000.

Electrification has already cost \$12,000,000. This sum includes \$4,000,000 already paid out and \$8,000,000 of obligations entered into in the last 60 days for equipment. With the electrification will also be completed a park project, so that the Illinois Central will run its first 8 miles virtually all through lake front parkway, lagoons, golf courses and bathing beaches.

The change in rates is expected to have a profound effect on part of the city's transportation, as all the lines have heavily populated zones in direct competition with elevated, bus and street car lines. The present Illinois Central 10-ride ticket fare to competitive stations is 11 cents a ride, the elevated 10 cents cash or three tickets for 25 cents, bus 10 cents and surface lines 7 cents. The railroad, however, makes the run in half the time. The Northwestern's 10-ride rate to competing territory is 11 to 19 cents a trip, the latter being the fare to Evanston. The road has 184 daily trains carrying 33,000 passengers. The other lines seeking the increase are the Burlington, with 185 trains daily, and the Rock Island.

Bus Legislation Suggested in Wisconsin

Agitation has been revived to tax bus lines in Wisconsin 3 per cent on their gross earnings, as a contribution to the state highway fund. It is estimated this tax would produce more than \$1,000,000 annually. An effort is also expected to be made at the present session of the Legislature to bring the bus lines under the supervision of the Railroad Commission with respect to service, routes and fares.

Home Rule Agitation Renewed

Suggestions have been made in Minnesota to have the Legislature of 1925 restore to the individual cities control of street car fares and regulation. In 1923 the Legislature authorized the Railroad and Warehouse Commission to regulate fares in St. Paul, Minneapolis and Duluth. Valuation hearings proceeded throughout the 2 years with only one decision, that in the Duluth case. St. Paul and Minneapolis evidence is now in the hands of the state commission. The Duluth order was annulled by a federal court ruling.

License Board Refuses Bus Permit to Boston & Worcester

The Worcester, Mass., license board has refused to grant the Boston & Worcester Street Railway permission to operate buses in Worcester as a part of the Boston-Worcester bus line. During the hearing it was made to appear unlikely that a satisfactory arrangement could be made with the Worcester Consolidated Street Railway for the transfer of passengers from buses to the trolleys at the city line.

The plans of the company as explained to the license board involved the operation of four 25-passenger buses on 2½-hour schedules. The proposed fare between Boston and Worcester was set at \$2. Two subdivisions of the fare were contemplated, however, one a \$1.25 fare to Marlboro from either terminal. Consolidated officials took the attitude that if the time had come for operation of buses it should receive the preference.

The Boston & Worcester representatives explained it wanted the buses even though it continued to maintain its Boston to Worcester trolley, to get back patrons lost to bus lines operating between the two cities.

The Boston & Albany Railroad was also placed on record against the petition. It was explained that this was not because of any feeling against the Boston & Worcester, but because the road felt there were adequate means of transportation between the two cities. The New York, New Haven & Hartford Railroad also went on record against the petition.

Mayor Michael J. O'Hara supported the stand taken by the license board.

Wants 7 Cents in Shreveport

The Shreveport Railways filed a petition with the Louisiana Public Service Commission on Jan. 14 requesting that body to permit an advance in rates from 6 to 7 cents per adult passenger. The fare for school children would remain at 2½ cents. The petition points out that the present fare of 6 cents was fixed by order of the Public Service Commission with the stipulation that certain improvements be made. These improvements were made, the petition asserts, at a cost of \$210,457. It is further declared that while the company is permitted to earn 8 per cent, during the period of Jan. 1, 1924, to Oct. 31, 1924, the company earned only \$17,122, whereas it should have earned \$116,667. It states that bankruptcy will follow such a condition, but that a rate of 7 cents would be likely to bring a gross income of \$734,355.

Illinois Traction Petitions to Handle Freight Into St. Louis

The Illinois Traction System has asked the city of St. Louis, Mo., for permission to handle carload freight into the city in order to supply many of the industries along its lines with coal and to haul carload business. At present the road is permitted to carry only passengers, mail and wrapped bundle freight. A hearing on the application for an amendment of its franchise ordinance was held by the public

utilities committee of the Board of Aldermen on Jan. 14. The Aldermen decided to hold a general public hearing on the matter on Jan. 29. A similar bill has been advocated several times in recent years, but it always failed to get beyond the committee.

In speaking at the hearing on Jan. 14, H. I. Green, general counsel Illinois Traction System, declared that more than twenty industries along the company's lines between the McKinley Bridge and the Twelfth Boulevard station at Lucas Avenue have petitioned for the direct freight service the company seeks to install. All can be served without any further track extensions except spurs into their places of business. Mr. Green informed the Aldermen that of the system's 600 miles of tracks, 450 miles have direct connection into St. Louis. He said it is an imposition to ask shippers to continue to haul freight to and from the foot of the McKinley Bridge.

Buses of Connecticut Company Get Into Movies

An 800-ft. film to show how its buses are kept in operating condition at its main garage in New Haven has been prepared by the Connecticut Company, New Haven. A somewhat similar film was prepared some years ago with the trolley cars as the subject. The bus movie was shown at the company's booth at the Hartford Industrial Fair this past week and attracted very favorable attention.

The film story is based on a conversation between two bus passengers as to the way in which the company keeps its buses in so good a condition. The conversation is held in the central part of New Haven, after one of the single-deck Yellow type D buses, carrying 29 passengers, has made a passenger stop. The scene of the film then changes to the company's garage in New Haven. An exterior of this garage is first shown. Then, the spectator is introduced to the repair and maintenance methods of the company and learns how the buses are fueled and oiled at the end of the runs, how tires are changed, how the buses receive their periodical inspection, and how they are washed daily. Other views illustrate the process of removing the engine from the chassis through the use of an overhead crane, how the engines are taken apart and inspected, how cylinders are ground and pistons fitted.

Seven Cents Not Yet Authorized in Binghamton

The Public Service Commission issued an order Jan. 16 authorizing the Binghamton Railway, Binghamton, N. Y., to continue in effect the present 6-cent fare pending a determination by the commission of the company's petition for an increase in fare to 7 cents. The 6 cent fare expired Jan. 16. It has been in effect since 1920, but has been continued from year to year by the city and the commission.

Hearing is scheduled for Jan. 23, in New York. Consent of the city of Binghamton to the proposed increase was referred to previously.

Davenport Will Continue on Lower Fare Temporarily

The financial statement of the Tri-City Railway, Davenport, Iowa, for the 6 months test period ended Dec. 31, 1924, shows a marked deficit in operating expenses. Despite this the company has notified Mayor Louis E. Roddewig and the Davenport City Council that the right to increase fares to 10 cents straight on Feb. 1 will not be enforced for the present and that the sale of three tickets for a quarter will be continued until a more satisfactory adjustment of the fare problem has been worked out. In a letter to the Mayor and the City Council, R. J. Smith, general manager, announced that the company will retain the existing rates for the present, in the hope that future patronage of the railway lines will show that the patrons of the company appreciate the lower fares granted to regular patrons through the sale of tickets.

In making this announcement, the company calls attention to the fact that the offer to retain this present rate of fares must not be construed to mean that the company has relinquished its right under the fare agreement made with a previous Council. This agreement gave the company the right to increase its rate of fare to 10 cents straight on Feb. 1, 1925, if the income of the six preceding months failed to show a return of at least 6 per cent on the company's investment.

Montreal Tramway to Expand

Montreal's rapid growth in the past few years has brought about serious problems of traffic congestion that can only be solved by broad and sweeping changes in the downtown handling of the service by the Montreal Tramway, Montreal, Que., says the *Canadian Financial Post*. That paper says construction work will proceed very soon on a new terminal station on Craig Street, in the downtown section.

The new terminal station will be a modest affair at first, consisting merely of a covered structure adjacent to the power building, but it may in time become a sky-scraping head office for the tramways. Small as is the initial structure, the land acquired is costing the company about \$500,000.

A committee of citizens and civic officials is now quietly at work producing a town-planning scheme for Montreal, and if some of the suggestions before the committee mature, the tramway and the city will have to co-operate in the construction of new lines, tubes and "arcades." The latter, while not touching the tramway directly, will enable it to improve its service. The plan is to move sidewalks on some main thoroughfares back about 10 ft. and build arcades under business structures to allow this to be done.

One of the local newspapers recently printed a story that the company intended to purchase the Montreal & Southern Countries Railway, but this was denied by officials. The line serves suburbs south of the St. Lawrence River. It is owned by Canadian National Railways.

News Notes

Resumption of Service Expected.—Public subscriptions taken during the last fortnight have pledged sufficient funds for the repair of the Lincoln Municipal Street Railway, Lincoln, Ill. Mayor Voepel has predicted the early resumption of service on the traction line, suspended after the mid-December storm. Service, however, will be limited and fewer cars operated.

Jitneys in Richmond Disappear.—Jitneys passed out of existence in Richmond, Va., on Jan. 1 after being the cause of dissension for many years. Determined efforts were made to prevent their cessation by jitney interests. Patrons of the jitneys questioned the legality of the ordinance which was passed in the City Council last summer by a small margin. The City Council had previously defeated the ordinance several times.

Wants Continuous Seven-Cent Fare.—The Board of Commissioners of Bradley Beach, N. J., has requested the Coast Cities Railway for a continuous 7-cent fare from Bradley Beach to Deal Lake. A conference will be held on the matter. The company was also asked to grant a transfer at Main Street, Asbury Park.

Refuses Bus Fare Increase.—The Michigan Public Utilities Commission recently refused to accept the petitions of the Star Motor Coach Company and the Wolverine Transit Company for a further increase in fares to 2½ cents a mile. The two companies started some weeks ago a co-ordinating service with the Detroit United Railways.

No Reason for Granting Bus Permits.—Despite agitation by a few citizens of Webster, Mass., advocating the granting of bus licenses, Selectmen of the town have issued statements declaring they would not be warranted in granting licenses to buses to run parallel to the lines of the Worcester Consolidated Street Railway. The Selectmen do not agree with the unfavorable criticism of the railway, particularly of its service. Sight is taken of the fact that the Consolidated has contributed a large sum toward the new East Webster bridge, has paid for cement work around the tracks on Main Street and incurred much other expense in improving its lines.

Not Opposed to Buses Which Do Not Parallel Car Lines.—President Wesley W. Sargent of the Fitchburg & Leominster Street Railway says he will not oppose buses either inside or out of Fitchburg, Mass., so long as they do not run parallel to the car lines. Mr. Sargent said he was willing that the bus operators run bus lines over sections of the city where the railway had failed to make its lines pay, but he did not believe they should be allowed to compete with the railway.

Wants Railway Service Restored.—A petition signed by 1,560 residents of Spencer and Leicester, Mass., for restoration of railway service between Spencer and Worcester has been forwarded to the Worcester Consolidated

Street Railway. The company discontinued service to Leicester and Spencer because unfair competition was permitted by local officials from bus lines.

Increased Rates in Effect.—The Empire State Railways, which operates a line between Syracuse and Oswego, N. Y., and the Rochester & Syracuse Railroad, which operates lines to Rochester, have put into effect new fare increases based on a rate of 3.6 cents a mile. The old rate was 3 cents a mile. Under the provisions of the Public Service Commission order the minimum fare is to be 5 cents, as at present. The Rochester line also secured an order reducing from 60 to 50 the number of persons required for a chartered car. Corresponding changes have been made in the charter car rates.

Another Direct Service to Downtown Chicago.—The Chicago & Joliet Electric Railway, control of which passed into the hands of Samuel Insull recently, will be linked direct to downtown Chicago in the near future via the elevated structure. Rapid transit will be afforded a great undeveloped territory heretofore unserved by any single agency going direct downtown.

Wife of Prominent Official Dies.—Mrs. Britton L. Budd, wife of the president of the Chicago Rapid Transit Company, Chicago, North Shore & Milwaukee Railroad and Public Service Company of Northern Illinois, died on Jan. 18 after an illness of several years. For many years Mrs. Budd took a very active part in charitable and social service work. She was an ardent student of music, astronomy, architecture and history. She was formerly secretary of the Amateur Music Club of Chicago and treasurer of the Guild of Associates of the Sisters of Saint Mary of the Episcopal Church. Interment was at Rosehill Cemetery after a private funeral service at the Church of the Atonement, Chicago.

Increased Fares Allowed.—Increased rates on the Pennsylvania-Ohio Power & Light Company's line between Youngstown and Hubbard call for a cash fare of 20 cents, but provide for commutation tickets at \$3 good for 46 rides. Between Youngstown and stops 15 and 28 the tariff provides a cash fare of 10 cents and includes a provision for a ticket rate of six tickets for 50 cents. Increased rates were filed some few years ago, but were restrained by a court order. The United States Supreme Court recently dismissed the injunction.

Interurban Commutation Books at Discount.—The Texas Interurban Railway, Dallas, Tex., effective Jan. 1, has begun issuing commutation books of 30 tickets between designated stations at a discount of 40 per cent from the regular one-way adult fare. These books are good for 30 one-way trips within 20 days from date of sale.

Seeks Higher Fare.—The Manchester Street Railway, Manchester, N. H., has petitioned the Public Service Commission for permission to increase its fares from 8 cents to 10 cents. The company claims that one-man cars have saved some money, but the loss in passengers carried has more than offset the saving. The number of passengers carried in 1924 was the lowest since 1913.

Foreign News

Great Grimsby, England, to Operate Tramways.—The tramway in the Borough of Great Grimsby is to be purchased from the Great Grimsby Street Tramways Company by the city. The price to be paid was referred to arbitration and was fixed at £109,848, no allowance being made to the tramway company for possible loss due to the severance of the purchased lines from those outside the borough. The gross revenue inside Great Grimsby is about £44,368 per annum.

Reduced Student Fares Demanded in Turkey.—Demanding that special fares should be granted to them, a number of students made a demonstration against the Société des Tramways et Electricité de Constantinople, not only holding up operation of the electric street railways, but doing some damage to the company's office. Under pressure from the local authorities the tramway company granted reduced fares to the students for a period of 10 days, pending the submission of the question to the Turkish government at Angora. A decision was given in the tramway company's favor and orders issued for the protection of its property against further damages.

Paris Cars and Buses to Carry Merchandise.—Packages or merchandise are to be carried on the cars and buses operated by the Paris Transports en Commun. During certain hours half the rear platform space will be reserved for the purpose, and at night the entire platform will be used. The day rate will be the same as a full passenger fare for parcels weighing from 22 to 55 lb., and two fares for parcels from 55 to 110 lb., which is the heaviest permitted. The night rate will be uniform at 1.5 francs for parcels up to 110 lb.

Moscow to Buy Buses.—The government of Moscow, Russia, plans to place orders for buses abroad to the amount of 10,000,000 rubles, according to an announcement made by the Soviet deputation which has been visiting London, Paris and Berlin to study municipal questions. Offers of French firms were most acceptable and they received the first order.

Barcelona Opens New Subway.—The metropolitan subway of Barcelona, Spain which has been under construction for 10 years or more, has been inaugurated under the official auspices of the Infante Ferdinand, representing the King. This single route underground electric railway connects two opposite quarters of the city, supplementing an otherwise adequate street car system.

Japan to Electrify Railroads.—The Japanese government is planning to electrify 400 miles of its main line railroads, according to T. Ogawara of Tokio, assistant director of the government railway engineering bureau, who is in the United States traveling in the west. The purpose of Mr. Ogawara's visit is to study the steam and hydro-electric plants of the United States and to discuss Japan's need with American manufacturers of equipment.

Financial and Corporate

Purchase Talk Revived at San Francisco

The special committee appointed by Mayor Rolph of San Francisco, Cal., to consider purchase of the Market Street Railway is scheduled for a meeting at which it is expected arrangements will be made for further negotiations with officials of the Market Street Railway to try to bridge the difference in valuations.

The Council has before it a revised appraisal of the Market Street Railway just completed by Fred Bullock, special accountant. It is said that his figures will bring the valuation up to nearly \$30,000,000, compared with \$27,000,000 three years ago.

Alternative plans for carrying out the proposal have been suggested as follows:

- 1. Vote bonds either for the entire purchase price or enough to provide a down payment to the company.
- 2. Amend the charter to permit an increase of fares to 6 cents to provide greater revenue in a "pay-as-you-go-plan."

When negotiations were in progress earlier in the year, the "pay-as-you-go-plan" was agreed upon as the best means of financing the purchase. It is said now that the adoption of a plan of this kind would be out of the question, particularly under the increased schedule now in force to trainmen.

Refunding Plan at Worcester to Be Modified

Instead of drawing up a new consolidated mortgage the Worcester Consolidated Street Railway, Worcester, Mass., has altered its plans and will use a first mortgage instrument, under which \$3,551,000 bonds are held in the treasury unissued.

In November a petition was filed with the Massachusetts Public Utilities Commission requesting authority to set up a mortgage, subject to underlying liens, whereby \$7,000,000 in consolidated mortgage bonds could be issued primarily to retire maturing bonds. Because of the size of the underlying liens, it was finally decided that the offering would probably meet with greater success and command a better price if the old first mortgage was used as the financing instrument. The company therefore plans to withdraw the petition before the Public Utilities Commission and ask authority to issue additional bonds under the old first mortgage.

The maturities of the company during the next 3 years total \$3,083,000. Under the first mortgage, which is known as the Worcester Consolidated Street Railway first and refunding mortgage, the company issued \$1,449,000 of 4½ per cent bonds in 1910. As the authorized limit is \$5,000,000 the company still holds \$3,551,000 unissued bonds.

A problem before the company is the interest rate. It is probable that

the new securities will carry an additional coupon to be cashed with the semi-annual 2½ per cent coupon.

Approval of Permanent Financing Measure Sought in Philadelphia

W. C. Dunbar, president of the Philadelphia Rapid Transit Company, Philadelphia, Pa., has submitted the draft of an ordinance to the president and members of the City Council seeking permission definitely and permanently to place its \$10,000,000 5 per cent issue authorized in 1911. Two changes are desired in the financing of these bonds

in order to take advantage of the present favorable market conditions. First, the company wishes to increase the interest rate from 5 per cent to 6 per cent, which will enable it to sell the bonds at or near par. Second, it is desired to make the bonds a direct mortgage lien upon the Market Street Elevated Passenger Railway. The statement says that this is a change in form but not in substance, since under the existing provisions of the indenture now securing the issue the entire equity in the Market Street property is indirectly pledged. The proceeds derived from the sale of these bonds will be used, first, to pay off the loan already secured and for which these bonds are now held as collateral, and, second, to finance the down payment upon the equipment purchased under the P. R. T. series "H" equipment trust and for other additions and betterments to property.

Duluth Valuation Fixed at \$5,009,510

Court Decides 6-Cent Fare, with Five Tickets for 25 Cents, Confiscatory—Adds 40 per Cent to Pre-War Cost of Pre-War Property to Give Effect to Present Day Prices

JUDGE WILBUR F. BOOTH of the District Court of the United States for the District of Minnesota on Dec. 29, 1924, rendered a decision in the suit brought by the Duluth Street Railway to enjoin the enforcement of an order of the Railroad and Warehouse Commission of Minnesota fixing the rate of fare at 6 cents cash with five tickets for 25 cents. The city of Duluth appeared as intervenor-defendant in the suit. The court fixed the fair rate base at \$5,009,510 and found a 7½ per cent rate of return reasonable. The decision was referred to briefly in the ELECTRIC RAILWAY JOURNAL for Jan. 10, page 73.

On July 13, 1922, the Railroad and Warehouse Commission made its first finding of fair value, rate of return and rate of fare. This it did under the new statute of the state of Minnesota enacted April 14, 1921, under which the street railways of the state were authorized to surrender existing franchises with the municipalities and ac-

cept indeterminate permits of the state of Minnesota, subject to regulation by the state commission and subject to an appeal providing for the trial of the case *de novo* by the state courts of Minnesota and consequently requiring the introduction of detail evidence of inventory, valuation, etc., in such case.

SIX-CENT FARE UNDER COURT ORDER

The Duluth company secured from the United States District court, Judges Sanborn, Morris and Booth presiding, a temporary restraining order permitting the charge of a 6-cent cash fare and compelling the company to issue receipts to passengers desiring to take advantage of the 5-cent ticket rate and the revenue representing such receipts to be held in escrow pending the final decision of the United States court in respect to the rate of fare. The case was tried before the Special Master in Chancery, who rendered his report to the United States court on Dec. 10, 1923. Exceptions were filed by

COMPARATIVE VALUATIONS OF DULUTH STREET RAILWAY—DULUTH DIVISION

	A. L. Drum & Co. Estimated Original Cost	Minnesota Railroad and Warehouse Commission's Decision, Dated July 13, 1922	Decision of U. S. District Court, Dated Dec. 29, 1924
Inventory property excluding land and materials and supplies.....	\$3,487,020	\$3,487,020	\$3,487,020
Expenditures not apparent in inventory.....	6,385	6,385	6,385
General overheads.....	759,642	488,183	369,534
Land.....	150,735	140,000	128,474
Materials and supplies.....	105,787	105,000	105,000
Cash working capital.....	87,312	30,000	30,000
Total cost new.....	\$4,596,881	\$4,250,203	\$4,126,413
Appreciation of pre-war property to give effect to present-day prices.....		514,797	1,132,075
Per cent appreciated.....		16.04	40.00
Total cost new, after giving effect to present-day prices....	\$4,596,881	\$4,765,000	\$5,258,488
Condition of depreciable property, per cent.....	86.02	83.00	83.00
Amount of depreciation deducted.....	510,548	763,300	786,331
Total cost new less depreciation, after giving effect to present-day prices.....	\$4,086,333	\$4,001,700	\$4,472,157
Cost of financing.....	229,844		89,075
Total physical property.....	\$4,316,177	\$4,001,700	\$4,561,232
Going value.....	800,000	500,000	350,000
Value of power contract.....	379,542	91,300	91,300
Additions July 1, 1921, to Dec. 31, 1921.....	6,978	6,978	6,978
Grand total.....	\$5,502,697	\$4,599,978	\$5,009,510

the interested parties and the case was heard by Judge Booth.

The decision rendered by Judge Booth released the company from impounding funds to cover the 5-cent ticket rate and establishes several important points in the valuation of electric railway properties. For instance, the court held:

1. That when the Railroad and Warehouse Commission made and filed its findings the legislative stage of the case was ended at that point and the judicial stage was reached and that the hearing before the state District Court on appeal provided for in the Minnesota statute is judicial and not a continuation of the legislative rate-making process, and that under such circumstances the street railway company had the right to bring the present suit in the federal court.

2. That a test period of rates fixed by the commission is not an indispensable prerequisite and that the present suit in the United States court was not premature as contended by the state commission and the city of Duluth.

As to the fixing of rates by the United States court, the court said:

The proceedings before the special master and in this court are not for the purpose of fixing a rate, but to determine whether the rate fixed by the commission is confiscatory. In *Pacific Gas & Electric Company vs. City and County of San Francisco*, United States Supreme Court, June 2, 1924, the court said: "Rate making is no function of the courts. Their duty is to inquire concerning results and uphold the guarantees which inhibit the taking of private property for public use without just compensation, under any guise."

Nevertheless, it is held that the parties are entitled to the independent judgment of the court upon the findings and conclusions of the commission. *Bluefield Co. vs. Pub. Ser. Com.*, 262 U. S., 679, 689.

The court added 40 per cent increase to the estimated pre-war cost of pre-war property to give effect to present day prices.

The court allowed a per cent condition of 83, the same as found by the commission, as compared with the per cent condition of 86.02 found by A. L. Drum & Company, consulting engineers for the company, from the inspection of property.

The court allowed the estimated original cost of general overheads without depreciation.

The court allowed \$91,300, the value found by the commission, for the hydro-electric contract for power. In discussing the power contract the court stated:

This contract has proved very advantageous and the steam plant has been superseded and has been dismantled. A

larger amount would have been justified (referring to the \$91,300 allowed by the commission). The master allowed nothing for this item, saying in his report:

"While this contract might be taken into consideration upon a sale of the property or a valuation for that purpose, it should not be considered in ascertaining the proper basis for rates as it belongs to the class of provident economical contracts which it is the duty of the company to make whenever possible so as to furnish economical service to the public."

I am not able to agree with the master in this view. The contract was a thing of value, and it differed from an ordinary contract for current supplies. It took the place of a physical plant which would otherwise have been necessary and would have been valued as a part of the physical items.

Under these circumstances I think the commission was justified in including this power contract as an item in the rate base.

The court allowed \$350,000 for going value figured on 10 per cent on the original cost of the inventoried physical property, excluding land and materials.

The commission excluded cost of financing, but the court allowed \$89,075 for cost of financing, stating:

In my opinion this is an item which should only be included provided the evidence shows that it had an actual as distinguished from a theoretical existence.

The court allowed the 7½ per cent rate of return as found by the commission.

The court allowed an item of hidden costs claimed by the company for expenditures incurred in the past on account of contributions imposed by city ordinances for civic improvements.

The court and commission adopted as plant base the estimated original cost of the inventoried property, excluding land and material and supplies, as agreed upon between A. L. Drum & Company, consulting engineers, representing the Duluth Street Railway, and B. T. Gifford, consulting engineer, representing the city of Duluth.

The tabulation published herewith gives a comparison of the values of the property as found by the United States court with the values found by the Minnesota commission and with the estimated original cost valuation found by A. L. Drum & Company.

The Master in Chancery found the value of the property under the several different bases to be as follows:

Value for rate-making purposes..\$4,599,978
Cost of reproduction, less depreciation, including going value.. 5,138,504
Estimated original cost 4,222,673

Separate Investment Company in New Jersey

Articles of incorporation for the Public Service Stock & Bond Company, Newark, N. J., organized to do a general business in investment securities, but to specialize in securities of the Public Service Corporation of New Jersey and its subsidiaries and underlying companies, were filed on Jan. 16 with the Secretary of State at Trenton.

The incorporators are Thomas N. McCarter, president of the Public Service Corporation of New Jersey; E. W. Wakelee and Percy S. Young, vice-presidents. The papers authorize 500,000 shares of no-par-value stock, which will be owned, except for qualifying directors' shares, by the Public Service Corporation. A million dollars will be paid into the treasury of the new company at the start of business on Feb. 1.

Mr. Young, in charge of finance of the Public Service Corporation, said:

The success of our various customer-ownership campaigns has given us a total of more than 70,000 stockholders and subscribers to stock. Adding bondholders and those who own securities of underlying companies, there are more than 120,000 financially interested in various Public Service enterprises.

Mr. McCarter will be president and Charles G. Colyer vice-president, in charge of the company's activities. T. W. Van Middlesworth will be treasurer and Charles M. Broder secretary. The company will have offices in the Public Service Terminal Building, Newark.

Customer-Ownership Campaign at Reading

Customer ownership is the purpose of a campaign being conducted by the Reading Transit Company, Reading, Pa., for the sale locally of \$1,250,000 of first and refunding mortgage gold bonds, series A, 6 per cent, dated Nov. 1, 1924, and due Nov. 1, 1954. The offering price is 98 and accrued interest to yield 6.15 per cent. In calling attention to the offering the company said that another opportunity is offered prudent investors to share in the earnings of one of their important public utilities, the first having been afforded in the sale of cumulative participating

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Street Railway Fares*	Jan. 1925	Dec. 1924	Jan. 1924	May 1921	May 1922
1913 = 4.84	7.17	7.17	6.91	7.24	6.88
Street Railway Materials*	Jan. 1925	Dec. 1924	Jan. 1924	Sept. 1920	Oct. 1924
1913 = 100	150.3	148.7	158.5	247.5	148.5
Street Railway Wages*	Jan. 1925	Dec. 1924	Jan. 1924	Sept. 1920	Mar. 1923
1913 = 100	221.0	220.8	217.4	232	206.6
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	Dec. 30 1924	Nov. 30 1924	Dec. 31 1923	July 31 1920	July 31 1924
	4.82	4.03	4.45	11.12	3.19
U. S. Bank Clearings Outside N. Y. City (Billions)	Dec. 1924	Nov. 1924	Dec. 1923	Mar. 1920	Feb. 1922
	18.23	16.66	17.30	18.54	10.65
Business Failures Number	Dec. 1924	Nov. 1924	Dec. 1923	Jan. 1924	Sept. 1924
Liabilities (Millions)	18.07	1.471	1.858	2.231	1.777
	51.60	29.51	80.30	122.95	27.71

Conspectus of Indexes for January, 1925

Compiled for Publication in this Paper by
Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Eng. News-Record Construction costs 1913 = 100	Jan. 1925	Dec. 1924	Jan. 1924	June 1920	Mar. 1922
	210.4	208.6	217.9	273.8	162.0
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Dec. 1924	Nov. 1924	Dec. 1923	Jan. 1920	Jan. 1922
	157.0	152.7	151.0	247	138
Bradstreet's Wholesale Commodities 1913 = 9.21	Jan. 1 1925	Dec. 1 1924	Jan. 1 1924	Feb. 1 1920	June 1 1921
	13.93	13.53	13.27	20.87	10.62
Dun's Wholesale Commodities 1913 = 120.9	Jan. 1 1925	Dec. 1 1924	Jan. 1 1924	May 1 1920	July 1 1921
	202.6	198.0	189.9	263.3	159.8
U.S. Bur. Lab. Stat. Retail food 1913 = 100	Dec. 1924	Nov. 1924	Dec. 1923	June 1920	Mar. 1922
	152	150	150	219	139
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	Dec. 1924	Nov. 1924	Dec. 1923	July 1920	Aug. 1922
	166.1	165.2	165.0	204.5	154.5

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of

materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 100 of the largest street and interurban railways in the United States, weighted according to the number of such men employed.

preferred stock of the Metropolitan Edison Company, with which the Reading Transit is affiliated.

The fact is emphasized that net earnings of the railway during the past year were more than three and one-half times the interest requirements on these bonds and the underlying divisional bonds. It is further pointed out that the mortgage under which the bonds are issued provides that 18 per cent of the gross revenues shall be devoted to the maintenance of the property each year, this amount being based on the experience of recent years, during which about \$200,000 was expended annually on the upkeep of the system.

The issue of bonds now offered is a direct first mortgage on important property owned by the company in and about the city of Reading, conservatively valued at \$2,600,000. This property includes the two main office buildings on South Fifth Street, carhouses, shops, other buildings, and the two plots of land they occupy on North Tenth and Eleventh Streets, the entire system of the Reading & Womelsdorf Electric Railway and all of the cars owned by the company, about 200 in number.

The proceeds from the sale of the bonds are to be used to retire \$400,000, principal amount, of first mortgage bonds of the Reading & Womelsdorf Electric Railway, which fell due on Jan. 1, 1925, \$40,000 principal amount of car equipment trust certificates and for other corporate purposes, principally improvements and betterments that are expected to be reflected in increased earnings for the company.

The Reading Transit Company was formerly known as the Reading Transit & Light Company. It operates about 200 miles of electric railway which it owns outright or controls through long-term leases, serving a population of more than 425,000.

Railway Service Discontinued in Rutland

Railway service in Rutland, Vt., has been withdrawn by the Rutland Railway, Light & Power Company. This move entirely eliminates electric railways as a transportation factor in and around Rutland, other lines connecting Rutland with neighboring towns having been supplanted previously by bus service. The buses that are being operated in the territory abandoned are not affiliated in any way with the railway. Rutland is a town of 15,000 inhabitants. Included in the railway system were 30 miles of track. The cash city fare has been 7 cents with four tokens for 25 cents.

Made Director.—J. S. McCulloch, president of the Union National Bank, Philadelphia, has been named successor to Col. Sheldon Potter as city member of the board of directors of the Philadelphia Rapid Transit Company. Colonel Potter resigned a month ago.

Foreclosure Ordered.—Foreclosure of a mortgage of \$375,000 against property of the Groton & Stonington Street Railway, Norwich, Conn., has been ordered by Anson T. McCook of Connecticut, acting in response to the re-

quest of a majority of bondholders. The Groton & Stonington Street Railway was controlled by the Groton & Stonington Traction Company, included in the system of the Shore Line Electric Railway.

Purchase Permitted.—The Public Service Commission has issued an order consenting to the purchase by the Niagara Falls Power Company of the capital stock of the Niagara Gorge Railroad and to the creation of a trust indenture for \$1,000,000 and the issue of \$949,000 in Niagara Gorge collateral trust 5 per cent gold bonds to be secured thereby. The power company has plans for the improvement of the road and the extension of its business, it was brought out at the hearing at Buffalo on Dec. 29. Certain riparian rights in the lower Niagara River are also acquired by the purchase of the railway.

Report of Portland Purchase.—The Albert Emanuel Company, New York, is reported to be negotiating for the purchase of three blocks of stock in the Cumberland County Power & Light Company, Portland, Me., which controls the Portland Railroad. The blocks which will be purchased if the deal goes through are said to be the holdings of E. W. Clark & Company of Philadelphia, J. & W. Seligman & Company, New York, and A. B. Leach & Company, New York. All the stock which figures in this transaction is common stock. Common stock in the company amounts to 30,000 shares. There are 40,000 shares of the preferred stock.

Most of Equipment to Be Scrapped.—The tracks and equipment of the Milford, Attleboro & Woonsocket Street Railway will be scrapped, according to Simon I. Edinburg of the Edinburg Meter Company, Worcester, Mass., who has purchased the equipment from the receivers. The cars were not included in the sale. The purchase price was not divulged. The property was bought subject to the approval of the Superior Court. There is about 30 miles of trackage. The line was abandoned more than a year ago.

New Members of Board Chosen.—At the meeting on Jan. 19 the number of directors of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., was increased from 16 to 18. Charles Hayden and Travis H. Whitney were added to the board.

Property Transferred.—The Tiffin & Fostoria Railway, Tiffin, Ohio, ceased to exist on Jan. 1. Sale of the company's properties, a 14-mile line linking Tiffin and Fostoria, to the Toledo, Fostoria & Findlay Railway was completed with a formal transfer made on Jan. 1. The purchasing company will continue the operation of the line on a rearranged schedule and will start a through Toledo-Findlay service.

Purchase Makes Personnel Change in Property.—The purchase of the Chicago & Joliet Electric Railway, Joliet, Ill., by the Central Illinois Public Service has caused changes in the official personnel of the new company. J. R. Blackhall, general manager of the railway, has been re-elected a director with William Redmond and George Woodruff, Joliet. Marshall E. Sampsell, Chicago, was elected president and a

director, succeeding Van Horn Ely, Philadelphia; Mr. Blackhall is vice-president; Martin J. Insull, Chicago, is a director, succeeding C. S. L. Tingley, Philadelphia; LeRoy J. Clark, Chicago, succeeds W. G. Clayton, and J. Paul Clayton, Springfield, succeeds W. R. Lippincott, Philadelphia. The complete official personnel is: Mr. Sampsell, president; J. Paul Clayton and J. R. Blackhall, vice-presidents; Mr. Clark, secretary; C. L. Nash and R. N. Tulpin, Springfield, assistant secretaries; C. E. Cripe, Springfield, treasurer, and C. Nash, Springfield, assistant treasurer.

Sale of Railway Reported Under Way.—Sale of the Valley Railways, Lemoyne, Pa., operating 44 miles of electric railway, principally in Carlisle and Lemoyne, is now virtually certain, subject only to the approval of the Public Service Commission. Almost 95 per cent of the stockholders have assented and deposited their stock, and about 80 per cent of the holders of the \$1,700,000 bonds have done likewise. The offer of purchase is said to have been on the basis of par for the bonds and \$44 a share for the stock. The identity of the purchaser has not been disclosed.

Preferred Stock Issue Proposed in Philadelphia.—The annual meeting of the stockholders of the Philadelphia Rapid Transit Company, Philadelphia, Pa., will be held on March 18 to elect directors for the ensuing year, and transact such other business as may come before the meeting, including the approval or disapproval of a proposed increase of the capital stock of the company from \$30,000,000 common stock to \$30,000,000 common stock and \$3,000,000 preferred stock or a total increase from \$30,000,000 common stock to \$33,000,000 common and preferred stock.

Railway Man Bus Bidder.—Harry B. Weatherwax, vice-president of the United Traction Company, Albany, N. Y., was one of the bidders at the recent sale of the franchise and equipment of the W.I.A.T. Bus Corporation before Justice Frank Cooper in federal court. Rutherford B. Hayes, prominent Albany builder and contractor, bid in the franchise and equipment at \$14,050. Mr. Hayes announced his plans to buy 10 new buses and spend nearly \$100,000 to rehabilitate the line. Benjamin Wheat was the other bidder. Mr. Weatherwax instructed his attorney to stop bidding at \$14,000, while Mr. Wheat withdrew from the bidding at \$9,100. The purchase must be approved by the Common Council of the city of Albany and the Public Service Commission before the transaction will become effective.

Sale of More Railway Lines Said to Be Under Way.—Negotiations for the sale of more American Electric Power Company properties to other utility interests are reported from Philadelphia. The properties are the Scranton Railway, Scranton, Pa., and the Altoona & Logan Valley Electric Railway, Altoona, Pa. The American Electric Power Company recently sold the Chicago & Joliet Electric Railway, along with other properties, to the Central Illinois Public Service Corporation, acting for the Middle West Utilities Company, Chicago.

Personal Items

J. P. Barnes Heads Kentucky Utilities Association

James Phillips Barnes, president of the Louisville Railway, Louisville, Ky., has had another honor conferred upon him. He has just been elected president of the Kentucky Association of Public Utilities, meeting at the Hotel Seelback, Louisville, Jan. 16. In that post he succeeds J. P. Pope, general manager of the Kentucky Traction & Terminal Company, Lexington. Mr. Barnes was the subject of an extended biographical sketch in the issue of the *ELECTRIC RAILWAY JOURNAL* for Jan. 23, 1923, on the occasion of his election to the presidency of the Central Electric Railway Association. Association honors are accordingly not new to him. As far back as 1917 he was president of the New York Electric Railway Association. He has also been a member of the executive committee of the American Electric Railway Association.

Wherever he has been located in a managerial capacity Mr. Barnes has been sought out for important association work because of his ability to mix and to get things done through co-operation. This ability has been recognized outside of official railway circles, with the result that the roster of Mr. Barnes' activities there includes his acting as a president of the Louisville Council, Boy Scouts of America; treasurer of the Arts Club and a director of the Citizens' Union National Bank and the Louisville Industrial Foundation. Probably not even Mr. Barnes himself could name all the clubs and associations of which he is a member in Louisville and other cities.

Alfred S. Davis Promoted at Providence

Coincident with the election of Walter Slade as vice-president of the United Electric Railways, Providence, R. I., Alfred S. Davis was appointed to the position of superintendent of power and lines. He has assumed full charge of the duties formerly performed by Mr. Slade. Mr. Davis is a newcomer in Providence. When the company launched a power expansion program about 2 years ago his services were secured. He was then assistant superintendent of power and lines. Previous to that time he had spent 2 years with Stone & Webster. He had also had experience in supervising power plants for the Connecticut Company. Mr. Davis' early engineering work began in 1900 with Eaton, Chase & Company.

After 4 years with this concern in the practice of installing steam and electrical machinery, he entered Tufts College and was graduated in 1908 with the degree of B.S. He then spent several years with the J. G. White Engineering Corporation and one year with the Electric Bond & Share Company.

The appointment of Mr. Davis to the United Electric Railways was mentioned in the *ELECTRIC RAILWAY JOURNAL*, issue of Jan. 20, 1923.

L. C. Datz with Bankers

Engineer Joins Newman, Saunders & Company, Inc., St. Louis Reorganization Managers

L. C. Datz has resigned as chief engineer of the Memphis Power & Light Company to become affiliated with the firm of Newman, Saunders & Company, in the reorganization of public utility properties in the Middle West. He will make his headquarters



L. C. Datz

in St. Louis. Mr. Datz has been actively engaged in public utility work ever since he was graduated from Tulane University of Louisiana in 1901, with the exception of 2 years when he was associated with a New Orleans contractor in designing and constructing dredges, dredging and cane loading machinery.

In 1903 Mr. Datz entered public utility work with the New Orleans Railway & Light Company. In 1911 he went with Ford, Bacon & Davis as assistant engineer, and a year later, when the American Cities Company was organized by Ford, Bacon & Davis and the New Orleans Railway & Light Company became a part of this group of Southern properties, he returned to the New Orleans company and served successively as engineer maintenance of way, engineer of roadway and chief engineer of this system.

When the United Gas & Electric Engineering Corporation established an office in the South in 1914, Mr. Datz became engineer of its Southern properties, with supervision of public utility properties in New Orleans, Houston, Birmingham, Memphis, Knoxville and Little Rock. He resigned as vice-president of this corporation in 1919, to become chief engineer of the American

Cities Company, which at that time formed an organization of its own to supervise its properties. He served in this capacity until April, 1922, when the American Cities Company was taken over by the National Power & Light Company, at which time he went to Memphis, Tenn., to become chief engineer of the Memphis Gas & Electric Company, and chief engineer of the Little Rock Railway & Electric Company, now under the supervision of the Electric Bond & Share Company.

When the Memphis Power & Light Company was organized on Jan. 1, 1923, Mr. Datz became chief engineer of that company, and since then has given his entire attention to the very extensive construction program it has carried on in the past two years.

Mr. Datz has always taken an active interest in engineering association work, both national and local. He is a member of the National Electric Light Association and of the American Electric Railway Engineering Association, serving as president of the latter in 1923. He is a member of the American Society of Mechanical Engineers, American Society of Civil Engineers, American Society for Municipal Improvements, and a member and past-president of the Louisiana Engineering Society.

H. W. Brundige President of California Commission

Harley W. Brundige has been elected president of the Railroad Commission of California. He succeeds Commissioner Clyde L. Seavey, who has held that position for the last 2 years.

Commissioners George D. Squires and Ezra W. Decoto, who were appointed by Gov. Friend W. Richardson to succeed Commissioners Irvin Martin and James T. Whittlesey, terms expired, have assumed their duties as members of the commission.

Commissioner Squires served as Insurance Commissioner of California the last 2 years. He is a practicing attorney. Commissioner Decoto has served a number of years as District Attorney of Alameda County. He is also an attorney of many years experience.

Bert Collett General Manager at Oak Park

Bert Collett, general superintendent of the Chicago & West Towns Railway, Oak Park, Ill., since 1921, was appointed general manager on Jan. 1, 1925. The position he formerly held has been discontinued. Mr. Collett entered the railway field in 1906 as superintendent of the Muncie & Portland Traction Company, Portland, Ind. He remained with this company in that capacity for 6 years. He then took on the duties of claim agent for the County Traction Company and the Chicago & West Towns Railway, the successor of the County Traction Company. Here he remained for another 6 years, up to 1918. In that year he became superintendent of transportation and gave his attention for the next 3 years to bettering the details of carrying passengers. Then it was that he assumed

the rôle of general superintendent. The property of which he is now general manager operates 70 miles of line and connects Oak Park, River Forest, Maywood, Melrose Park, Cicero and other important places in the vicinity of Chicago.

Walter C. Slade Vice-President at Providence

Walter C. Slade is the new vice-president of the United Electric Railways, Providence, R. I. To this position he was promoted from that of superintendent of power and lines, which he assumed in September, 1915, when the local railway property at Providence was known as the Rhode Island Company.

During his last two years of service as superintendent of power and lines Mr. Slade's work was especially noteworthy. In addition to supervising the regular operation and maintenance of the power and line departments he had general supervision over the work of planning and constructing extensive



W. C. Slade

improvements on the power system involving the expenditure of slightly more than \$2,000,000. These improvements involved an extensive modernization program in the power plant, the construction of two new substations, improvements in three more substations, the construction of additional overhead, an underground transmission circuit and the installation of a track circuit block signal system on a high-speed line.

His first position was with the General Electric Company, at Pittsfield, Mass., in the laboratory staff. He was born in Providence in 1885 and was graduated from Brown University with the degree of Ph.D. in 1907. Later he was graduated from the Massachusetts Institute of Technology.

V. W. Burley Appointed Assistant Manager at Binghamton

V. W. Burley, general superintendent of the Binghamton Railway, Binghamton, N. Y., was recently appointed assistant general manager by President Fuller with the approval of the board. In announcing the promotion of Mr. Burley, President Fuller said the details of the work of management had

increased so rapidly within the last year that he could not give them sufficient attention, and, further, that every assignment given to Mr. Burley in the last few years had been handled with distinction and good results to the company and with satisfaction to him.

The new assistant general manager has been general superintendent only since April, 1923. He entered the employ of the Binghamton Railway as a conductor in 1910. For 10 years before that he had been connected with the Pennsylvania Railroad. It is believed that he, above all other people, is best suited to fill the position of assistant general manager, having fulfilled the duties of conductor, inspector, dispatcher, claim agent and superintendent of transportation.

F. M. Black Made Vice-President at Winnipeg

F. M. Black, Provincial Treasurer of Manitoba, has been offered the specially created position of vice-president in charge of finances of the Winnipeg Electric Company, Winnipeg, Canada. Mr. Black is regarded as one of the outstanding financial men in western Canada, where he has been held in high repute for a number of years. In 1916 and 1917 he was president of the Calgary Board of Trade and in 1917 was also a member of the Alberta Public Utility Commission. For some time during the war he was on the staff of the Food Control at Ottawa, and later became associated with the United Grain Growers' Association. This last position he relinquished when he resumed his position as Provincial Treasurer.

In announcing the important appointment, A. W. McLimont, vice-president and general manager of the Winnipeg Electric Company, said that in view of the growth and development of the business of his company and its subsidiaries during the past few years and the increased activities required in connection therewith, it had been considered advisable to have associated with the company some person of broad financial experience who could devote all of his time to that branch of the company's affairs. It was with this object in view that the position of vice-president was created for Mr. Black and accepted by him.

Premier Bracken of Manitoba has expressed the regret of the government in losing so able a minister as Mr. Black, who handled the finances of the province during a most difficult time and had thereby won for himself great appreciation.

John T. Lyle, Jr., is first vice-president of the Meridian Light & Railway Company, Meridian, Miss., succeeding S. B. Irelan.

J. H. Bruce, traffic manager of the London County Council Tramways, London, England, who was appointed to take over the management of the system until Dec. 31, following the retirement of A. L. C. Fell, will be continued as operating manager until April 30 next.

Obituary

John Z. Murphy

John Z. Murphy, electrical engineer for the Chicago Surface Lines, Chicago, Ill., died Jan. 17 at Phoenix, Ariz., where he had gone to recuperate his health. He had been connected with surface railway operation in Chicago nearly 40 years. Mr. Murphy began his engineering career with a primitive mode of transportation—water. This connection was with the old Michigan & Illinois Canal, but shortly thereafter his engagements widened to include other canals and to embrace railroads and public works. In 1889 he became chief operating engineer for the West Chicago Street Railway and subsequently was noted for his work in the construction of tunnels under the Chicago River.

In other words, from 1876 to 1889 Mr. Murphy was continuously engaged in engineering work on railways, canals and public enterprises through-



J. Z. Murphy

out the Middle West. Problems in marine engineering also received much attention and his years were busy ones.

As the engineer in charge of the Rockwell and Madison Streets power house for the West Chicago Street Railway he successfully surmounted some very serious obstacles in construction and won the admiration of members of his profession. When the power house machinery was accepted Mr. Murphy returned to the lakes in 1889 as chief engineer for the Marinet Barge Company.

In 1892 the late John M. Roach appointed Mr. Murphy chief engineer for the West Chicago Street Railway. In 1908 he was made chief engineer for the Union Traction Company. In 1914, following unification of surface lines, he became electrical engineer for the Chicago Surface Lines, a post he held at the time of his death. He was also a member of the Chicago board of supervising engineers.

As long ago as October, 1911, the Chicago Examiner in a series of articles on men who had done most for Chicago said that in the engineering profession no man stood higher in that city than Mr. Murphy, engineer in charge of the vast work of reconstruc-

tion and rehabilitation of the West Chicago Street Railway and the Union Traction Company and who had been continued in his high position by the Chicago railways. That paper said:

In the upbuilding of the West where today stand the giant enterprises representative of the prowess of our age there have been required men of high courage, of broad views and of inventive minds to plan and to execute, and Chicago and the West owe a debt to the engineers, civil, mechanical and electrical, whose genius has made our present achievements possible.

And in that select company the Examiner said Mr. Murphy stood very high.

Mr. Murphy was born in Chicago in 1857.

Secretary of Cleveland Fare Box Company Dead

Sara E. Brannon, secretary-treasurer of the Cleveland Fare Box Company since its organization in 1911, died Jan. 5, following a wound received while she was on a mission of mercy. In 1908 Miss Brannon was employed by W. T. Cook as secretary. He was at that time general superintendent of the Municipal Traction Company, Cleveland. She continued with him in that capacity under the receivership that followed the Municipal Traction Company. It was a few years later when the Cleveland Fare Box Company was organized that she went to that company as secretary-treasurer and she continued in that capacity up to the time of her death. Miss Brannon was 43 years old. She went to Cleveland in 1904, working for the next 4 years with the Land Title Abstract & Trust Company. She was born in Mageestown, Pa., and attended college in Meadville.

John M. Johnson, traffic supervisor of the Columbus Railway, Power & Light Company, Columbus, Ohio, died recently. He had been identified with the company for 32 years.

Charles Barnes Beckwith, president of the Beckwith-Chandler Company, New York, N. Y., and Newark, N. J., varnish and paint manufacturers who specialize in products for steam and electric railways, died suddenly on Jan. 20 of heart disease, at the age of 62.

Charles H. Clark, president of the Waterbury & Milldale Tramway, Waterbury, Conn., died on Jan. 17, aged 92. Mr. Clark was president of the Southington Bank & Trust Company and the Clark Brothers Bolt Company. He served in the Legislature and was the oldest active bank president in Connecticut.

Arthur D. Prince, senior assistant division engineer of the Board of Transportation of the City of New York, died on Jan. 20. Mr. Prince was born at Glen Cove on Oct. 21, 1870. He was graduated as a civil engineer from Columbia in 1899 and joined the engineering staff of the Metropolitan Street Railway, New York. Later he went into the Department of Public Works and the Department of Street Improvements in New York City. He was assistant engineer in charge of highway construction in the Bronx. In 1900 he became assistant engineer to the old Public Service Commission.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Standard Forms Adopted

Standard invoice, purchase order and inquiry forms for recommended use by all branches of American industry and commerce were adopted by a national conference held under the auspices of the Division of Simplified Practice, Department of Commerce, at Washington, D. C., Jan. 14. Forty-five organizations were represented at the conference. These included the producer, distributor and consumer as well as the wholesaler and retailer in the leading commercial fields.

The movement started in 1919, when 417 associations were invited by the National Association of Purchasing Agents to a conference in Philadelphia to discuss the subject. For 2 years thereafter a joint committee representing the Railway Officers' Accounting Association, the American Railway Association, the National Association of Cost Accountants and the National Association of Purchasing Agents studied the problem from every angle. In 1921 a national standard invoice form was adopted by these four associations for recommended use by its members. Since that time a number of other large associations have officially indorsed it and have put it to actual use.

A survey of a large number of representative firms showed an estimated average saving of \$620 a year if all invoices received were standardized. This would amount to an aggregate annual saving of \$15,000,000 in all lines of American business. Since this figure applies only to the standard invoice, the conference has started a movement which will involve a much larger figure through the standardization of purchase order and inquiry forms as well.

Copies of the standard invoice, inquiry and purchase order forms as adopted by the conference may be secured upon application from the Division of Simplified Practice, Department of Commerce, Washington, D. C., or from the National Association of Purchasing Agents, Woolworth Building, New York, N. Y.

Virginian Railway Locomotive Inspected

An inspection by officials of the Virginian Railway, American Locomotive Works and the Westinghouse Electric & Manufacturing Company recently was made of one of the new Virginian electric locomotives. It was built by the American Locomotive Works and had just arrived at East Pittsburgh, where the electrical equipment was installed by the Westinghouse company.

This is the first unit to be built in connection with the \$15,000,000 electrification project of the Virginian Railway to electrify 134 miles of line, including 213 miles of track, lying be-

tween Roanoke, Virginia, and Mullens, W. Va. Three motive power units comprise one complete locomotive, making it the largest in the world.

Two Big Wheel Companies Merge

The National Car Wheel Company and the Southern Wheel Company were merged on Jan. 1, 1925, and are now operating under the name of the Southern Wheel Company. The plants are located at Pittsburgh, Sayre, Pa.; Cleveland, Rochester, St. Louis, Birmingham, Atlanta, Savannah and Portsmouth, Va. The company manufactures chilled iron wheels at all these plants, and in addition mine cars and parts at St. Louis and Birmingham, also miscellaneous gray iron castings at Pittsburgh. The general offices are in the Keystone Building, Pittsburgh. This company is a subsidiary of the American Brake Shoe & Foundry Co.

Bituminous Production Large

Figures compiled by the Department of the Interior indicate that the total output of soft coal for 1924 will be approximately 467,700,000 net tons. This is nearly 100,000,000 tons less than was mined in 1923, but is in excess of the production for 1919, 1921 or 1922. In comparing this estimate with the

ESTIMATED PRODUCTION OF BITUMINOUS COAL (Net Tons)	
Calendar Year	Production
1918.....	579,386,000
1919.....	465,860,000
1920.....	568,662,000
1921.....	415,922,000
1922.....	422,268,000
1923.....	564,152,000
1924 (preliminary).....	467,700,000

final figures for earlier years, however, it must be remembered that the preliminary estimates are usually from 2 to 3 per cent too low. It is possible, therefore, that final figures may show a total for 1924 as high as 480,000,000 tons. The production by years is given in the accompanying table.

Metal, Coal and Material Prices

Metal—New York	Jan. 20, 1925
Copper, electrolytic, cents per lb.....	14 75
Copper wire base, cents per lb.....	17 25
Lead, cents per lb.....	10 00
Zinc, cents per lb.....	7 97
Tin, Straits, cents per lb.....	56 00
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.....	\$4.30
Somerset mine run, Boston, net tons.....	2.125
Pittsburgh mine run, Pittsburgh, net tons.....	1.95
Franklin, Ill., screenings, Chicago, net tons.....	1.95
Central, Ill., screenings, Chicago, net tons.....	1.95
Kansas screenings, Kansas City, net tons.....	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.....	\$7 25
Weatherproof wire base, N. Y., cents per lb.....	20 00
Cement, Chicago net prices, without bags.....	2.10
Lined oil (5-lb. lots), N. Y., per gal.....	\$1.18
White lead in oil (100-lb. keg), N. Y., cents per lb., earload lots.....	0.1347
Turpentine (bbl. lots), N. Y., per gal.....	0 93

Rolling Stock

Durham Public Service Company, Durham, N. C., it is reported, has ordered three Mack railway-type buses.

Richmond Light & Railroad Company, Staten Island, N. Y., has just purchased two double-truck Russell snow sweepers. One was delivered just in time to be of great service during the recent heavy snowfall.

Asheville Power & Light Company, Asheville, N. C., has received five of the 22 new cars ordered some time ago. The remainder will be shipped as soon as possible. All the cars are of the latest one-man type, with up-to-date devices. They are being made by the Brill Company, Philadelphia. Two new buses are also expected by the company for the West-Asheville line.

Track and Line

Coast Cities Railway, Asbury Park, N. J., has been granted permission to install a loop at Cookman Avenue and Main Street, Asbury Park.

Williamsport Passenger Railway, Williamsport, Pa., plans to lay an additional track on Market Street, to install in Markey Square curves connecting Market Street lines; a connecting track to East and West Third Streets; a single track in Washington Street to connect at Market. The new track amounts to almost a mile. Requests are being made to the City Council.

Altoona & Logan Valley Electric Railway, Altoona, Pa., in 1924 used 296 tons of new rails, paved 17,368 track feet, used 1,000 steel and 12,066 wooden ties and renewed 139 poles.

Dallas Railway, Dallas, Tex., during 1924 spent more than \$1,000,000 for extensions, improvements, new equipment and paving, and added more than 9 miles of track to its system. Nearly 4 miles of this track represents new trackage, constructed during the year. Of the more than 9 miles of track added, 5.2 miles is accounted for by the taking over of the Trinity Heights line. The new trackage added to the system during 1924 represents a cost of about \$200,000.

Asheville Power & Light Company, Asheville, N. C., will build a line from Biltmore Avenue out the Black Mountain highway, a distance of 6 miles. The golf course will lie on one side of the new line and the recreation park on the other. The extension of the railway on the Black Mountain highway, together with the purchase of real estate, will represent an investment of many thousands of dollars.

New York, N. Y. — The Board of Transportation recently directed that bids be advertised for the construction of a portion of the Washington Heights subway route under the proposed Broadway Temple at 173d Street and Broadway. The bids are to be received and publicly opened Feb. 6, 1925.

Intercity Terminal Railway, North Little Rock, Ark., will extend its East Second Street line to the city limits of North Little Rock. Persons residing in the section have agreed to relieve the

company of the cost of paving between the rails and 18 in. on either side of the new line.

Shops and Buildings

San Diego Electric Railway, San Diego, Cal., plans to construct extensive new shops. The new building will cover an entire square block and will furnish additional space for machine shops, paint shops, storehouses, carpenter shops and new garages for the buses. Additional space for the storage of heavy road equipment, material yards, shop offices and a lot of new electrical and mechanical devices for the handling of materials and repair work are provided for.

Community Traction Company, Toledo, Ohio, will abandon the Dorr and Galena Streets carhouses on Feb. 1. The Dorr carhouse will be used for storage of inactive cars. The Galena carhouse is in need of repair and will be razed. The abandonment will mean a saving of \$15,000 a month in operation of the system.

New Incorporation

Ashtabula & Shore Line Railway, Ashtabula, Ohio, was recently incorporated with a nominal capital of \$10,000 by Fred R. Moseley and associates. The company will operate a belt line electric railway, connecting the various steam roads entering the city.

Trade Notes

George E. Doke, engineer of materials and equipment tests of the New York Central Railroad, at New York, has resigned, effective Feb. 1, and has been elected president of the Association of Manufacturers of Chilled Car Wheels, with headquarters at Chicago. He succeeds **George W. Lyndon**, who died on Oct. 7, 1924. From 1897 to 1900 Mr. Doke served on the Indiana, Illinois & Iowa, now a part of the New York Central Railroad. Later he served on the Lake Shore & Michigan Southern. In 1916, following a consolidation of the Lake Shore & Michigan Southern with the New York Central, he was promoted to assistant engineer of tests in charge of material inspection for the car and locomotive departments of the New York Central system. Four years later he was again promoted to engineer of materials with headquarters at Cleveland, Ohio, in charge of materials inspection and the creation and development of material specifications. Two months later he was made engineer of tests of the New York Central Railroad in New York City. Since 1922 he has served as engineer of materials and equipment tests of the New York Central Railroad.

Roller-Smith Company, New York, N. Y., announces the appointment of **W. H. Pugh** as its representative in the northeastern part of Pennsylvania, with headquarters at its factory at Bethlehem, Pa. Until recently Mr. Pugh represented the Roller-Smith Company in the territory immediately adjoining Bethlehem, but on Jan. 1 his territory

was enlarged. Before Mr. Pugh became associated with the Roller-Smith Company, many years ago, he was superintendent of the Columbia Meter Company at Indianapolis, which concern was later taken over by the Roller-Smith Company.

Norma-Hoffmann Bearings Corporation, Stamford, Conn., announces that its factory and general offices have been moved to a new plant at Stamford. The Long Island City plant is discontinued and all shipments will now be made from the new address.

Massey Concrete Products Corporation has established a district sales office in the Dixie Terminal Building, Cincinnati, Ohio. This district will comprise the states of Ohio, Indiana, Kentucky, West Virginia, and a part of Pennsylvania. **W. Lyle McDaniel** has been appointed resident manager of this district.

Joseph W. Irwin, until recently president of the Mitchell Spring & Manufacturing Company, Johnstown, Pa., has resigned to become connected with his former associates as general superintendent of the Fort Pitt Spring & Manufacturing Company, Pittsburgh, Pa.

O. L. Chapman has joined the sales organization of the Scott Valve Manufacturing Company, Detroit. Mr. Chapman will devote his time to the application of valves to manufacturing plants and similar lines of industry.

New Advertising Literature

Portland Cement Association, Chicago, Ill., has issued a 300-page volume entitled "History of the Portland Cement Industry in the United States." The book is illustrated and the material is arranged in an instructive way for the layman as well as for the technical man.

Combustion Engineering Corporation, New York, N. Y., has issued a bulletin describing a stoker which its associates in England have installed throughout the British Isles and continental Europe. It possesses several features which are unusual in this country.

Conveyors Corporation of America, Chicago, Ill., has issued a broadside showing the newly designed American monorail cable conveyor. Its corps of engineers has been working on the design of this equipment for several years. The folder contains illustrations.

Sullivan Machinery Company, Chicago, Ill., has just published booklet 126, entitled "You Can Do It Quicker with Air." This booklet has 60 illustrations of rock drilling, concrete breaking, asphalt cutting, digging clay, riveting steel work, drilling wood and metal, sand blasting, spray painting, and other uses of compressed air, and features the Sullivan portable air compressors and air equipment used with them. Bulletin 76-E, "Portable Electric Hoist," describes the Sullivan single-drum and double-drum portable electric hoists at 6½ hp., 2,200-lb. vertical lifting capacity with single line.

Condit Electrical Manufacturing Company, Boston, Mass., has issued a folder describing its type N-4 oil motor starter.

A Surplus in reserve

What a satisfying feeling it is—to know there's a good-sized surplus in reserve, to draw on if emergency arises. It may be a financial surplus, or physical strength or emergency hand brake equipment.

PEACOCK STAFFLESS BRAKES

have surplus chain-winding capacity for any emergency



"The Peacock Staffless"

There is
no substitute

Order Peacock Staffless Brakes

National Brake Company

890 Ellicott Square

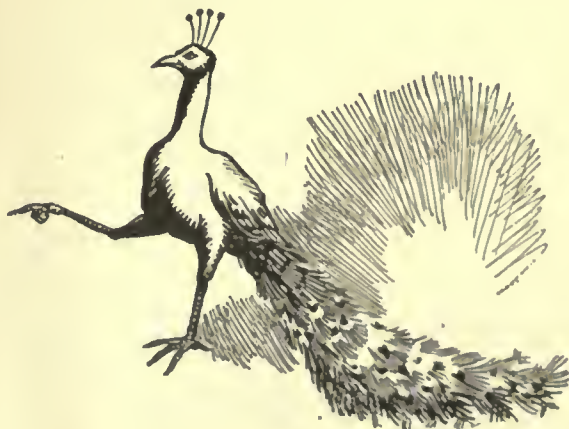
Buffalo, N. Y.

Canadian Representative

Lyman Tube & Supply Co., Ltd., Montreal, Can.

YOUR motormen will have more confidence, and operate cars more efficiently, if they know their hand brakes have surplus chain-winding capacity—a reserve of braking ability which means they'll always work—and hold!

There's nothing so discouraging as a hand brake which clogs and jams, long before full braking power is applied. That condition never exists where Peacock Staffless Brakes are used. The powerful braking force is felt, as soon as a few turns of the wheel are made. These brakes can never choke with chain, for there's ample capacity to wind in any amount.



Bankers and Engineers

Ford, Bacon & Davis Incorporated Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation

Engineers—Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES

New York

Boston

Chicago

THE BEELER ORGANIZATION

ENGINEERS AND CONSULTANTS

Traction-Traffic-Equipment-Power

COORDINATION OF SERVICE—IMPROVED OPERATIONS

INCREASED TRAFFIC—FINANCIAL REPORTS

APPRAISALS—MANAGEMENT

52 Vanderbilt Ave.

New York City

SANDERSON & PORTER ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT and POWER PROPERTIES

CHICAGO

NEW YORK

SAN FRANCISCO

ENGELHARDT W. HOLST

Consulting Engineer

Appraisals, Reports, Rates, Service Investigation,
Studies on Financial and Physical Rehabilitation
Reorganization, Operation, Management

683 Atlantic Ave., Boston, Mass.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

JOE R. ONG

Consulting Transportation Engineer

Specializing in Traffic Problems and in Methods to
Improve Service and Increase
Efficiency of Operation

PIQUA, OHIO

STEVENS & WOOD, INC.

Design and Construction of Power Stations
Railroad Electrification, Industrial Plants

REPORTS AND APPRAISALS

Management and Financing of Utilities and Industrials

Mahoning Bank Bldg.

120 Broadway

Youngstown, O.

New York

Dwight P. Robinson & Company

Incorporated

Design and Construction of

Electric Railways, Shops, Power Stations

125 East 46th Street, New York

Chicago

Youngstown

Atlanta

Philadelphia

Los Angeles

Montreal

Rio de Janeiro

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells

Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management Operation Construction

43 Cedar Street, New York City

DAY & ZIMMERMANN, INC.

ENGINEERS

DESIGN - CONSTRUCTION - REPORTS

VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly Pass—Differential Fares
Ride Selling

143 Crary Ave., Mt. Vernon, N. Y.

Byllesby Engineering & Management Corporation

208 S. La Salle Street, Chicago

New York

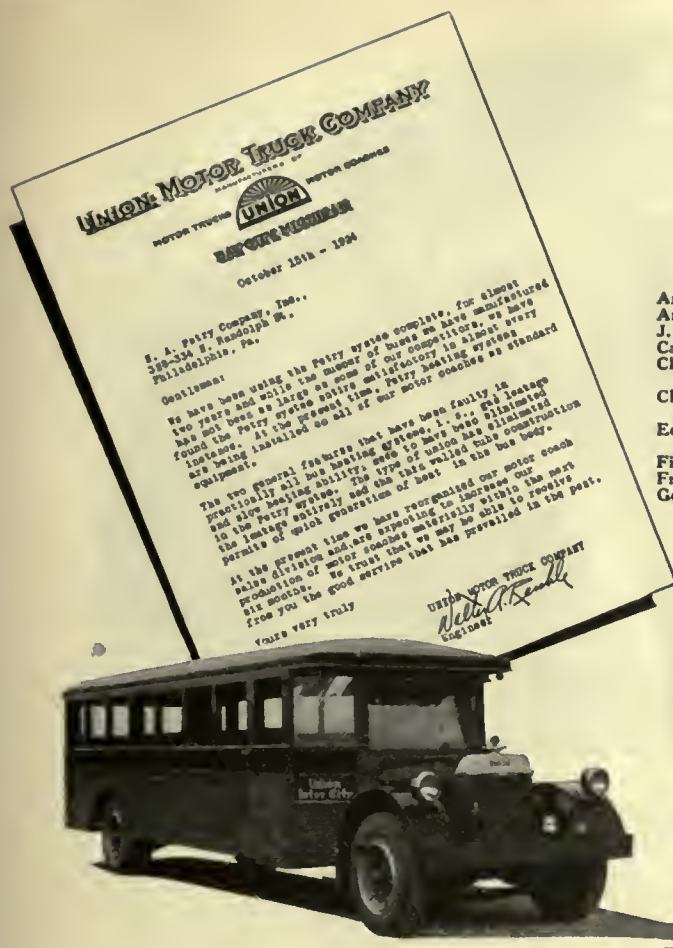
Tacoma

The Most Successful Men in the Electric Railway

Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week



UNION MOTOR TRUCK COMPANY
 PHILADELPHIA, PA.
 MOTOR TRUCKS
UNION
 MOTOR COACHES
 October 15th - 1924

S. A. Petry Company, Inc.,
 338-334 S. Randolph St.,
 Philadelphia, Pa.

Gentlemen:

We have been using the Petry system complete, for almost two years and while the number of buses we have manufactured has not been as large as some of our competitors, we have found the Petry system satisfactory in almost every instance. At the present time, Petry heating systems are being installed on all of our motor coaches as standard equipment.

The two principal features that have been faulty in practically all bus heating systems, i. e., gas leakage and slow heating ability, have now been eliminated in the Petry system. The type of union has eliminated the leakage entirely and the thin walled tube construction permits of quick generation of heat in the bus body.

At the present time we have reorganized our motor coach sales division and are expecting to increase our production of motor coaches materially within the next six months. We trust that we may be able to receive from you the good service that has prevailed in the past.

Yours very truly
 N. A. Petry
 President

UNION MOTOR TRUCK COMPANY
 PHILADELPHIA, PA.

Union Motor Truck Co.

Bay City, Michigan

Uses the

PETRY

Bus Heating System

Some Other Users:

American Body Company
 American Motor Truck Co.
 J. C. Brill Company
 Camden County Bus Association
 Champion Auto Equipment Company
 Chicago North Shore & Milwaukee R. R.
 Edwards Railway Motor Car Company
 Fifth Avenue Coach Company
 Fremont Metal Body Company
 General Motors Truck Company

Hahn Motor Truck Company, Inc.
 Hampstead Mill & Body Works
 International Harvester Co.
 International Motor Company
 G. C. Kuhlman Car Company
 Royal Motor Coach Co., Inc.
 Six Wheel Company
 Twin City Motor Bus Co.
 United Electric Railway Co.
 Wiener Body Company
 Wisconsin Motor Coach Co.
 The Yellow Coach Mfg. Co.

N. A. PETRY COMPANY, Inc.

347 North Randolph St.

Philadelphia, Pa.

Pacific Coast Representative
 Norman Cowan Co.
 451 Rialto Building
 San Francisco



Valve Type
No. 210

The Most Successful Men in the Electric Railway

Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

C. R. BUCHANAN
President

W. H. PRICE, JR.
Sec'y-Treas.

JOHN F. LAYNG
Vice-President

BUCHANAN & LAYNG CORPORATION

Engineering and Management, Construction,
 Financial Reports, Traffic Surveys
 and Equipment Maintenance

BALTIMORE
825 Equitable Bldg.

Phone:
Hanover 2142

NEW YORK
49 Wall Street

JAMES E. ALLISON & CO.

Consulting Engineers

Specializing in Utility Rate Cases and
 Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.

Engineers and Contractors

SYRACUSE, N. Y.

THE P. EDWARD WISH SERVICE

50 Church St.
NEW YORK

Street Railway Inspection
DETECTIVES

131 State St.
BOSTON

Bureau of Commercial Economics, Inc.

Industrial Engineers

Organization • Methods • Layout and Facilities
 Public and Industrial Relations

72 West Adams Street • CHICAGO

HUMAN ENGINEERING

Railway Audit and Inspection Company, Inc.
 Franklin Trust Building, Philadelphia

Boston
New Orleans

New York
Pittsburgh

BRANCHES

Baltimore
Chicago

Atlanta
St. Louis

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



Shock Resistance.

WHEN wheel after wheel comes in with chipped rims, "shell-outs" and "slid-flats" the need of a tough wheel metal is obvious.

Many of your worst wheel troubles arise from lack of resistance to shock and impact.

Just these needed qualities are found in Davis "One-Wear" Steel Wheels. Davis Wheels possess a greater resistance to impact than any wheel made.

Consequently withdrawals from service for wheel failures drop as Davis "One-Wear" Steel Wheels go under your equipment.

Davis Wheels practically eliminate wheel removal for "slid-flats," "shell-outs" and similar troubles.

Yet this increased reliability costs no more to have, for Davis "One-Wear" Steel Wheels have a low cost per mile record.

American Steel Foundries
NEW YORK CHICAGO ST. LOUIS

DAVIS
"ONE-WEAR"
STEEL WHEELS



Station CCH broadcasts the program
of using electric car heaters exclusively

This is Station CCH, the Consolidated Car Heating Company at Albany, broadcasting direct from its factory a special message of interest to electric railways who are using stoves in their cars for heating.

Controlling Heaters on One-man Cars—

THE desirability of heating cars electrically as compared with coal burning heaters is generally admitted. Thermostat control has regulated and assures the economical use of the only cost of heating—the current.

There is another problem to consider these days. The rapid spread of the one-man operation idea makes the electric car heater with thermostat control an ideal equipment for the modern car, because it eliminates all need for attention by the car operator.

Consolidated Heaters are made in various styles for all types of cars. 26 different types of Consolidated Electric Car Heaters have been inspected and approved by the Underwriters Laboratories maintained by the National Board of Fire Underwriters.

Station CCH now signing off until next week, when it will resume broadcasting with another weekly message.

Good day!

HEATERS



CONSOLIDATED CAR HEATING CO.
ALBANY, N. Y.

New York

Chicago



McGraw-Hill Transportation Publications

The motor bus today is universally recognized as an established factor in passenger transportation.

Electric Railway Journal for nearly ten years has carried to its readers constructive information regarding the economic use of the bus and how it can be operated in conjunction with existing electric railway facilities. Today it is carrying this message to the officials of ninety-nine per cent of the electric railway companies in the United States and Canada.

Bus Transportation, since its inception, has made available the experiences of the most successful operations in the entire bus field. Building schedules, fare collection, public relations, design and maintenance of chassis and bodies, the formation of bus associations, the value of bus terminals—these and scores of other fundamentals of successful and profitable operation are discussed in a practical manner in every issue.

A constantly increasing number of readers attest the value of this service.

McGraw-Hill Company, Inc.

Tenth Avenue at 36th Street, New York

Subscription Rates

Both publications
in combination,
\$5.00 per year;
Electric Railway
Journal alone, \$4.00
per year; Bus
Transportation,
\$2.00 per year.

SLEET CUTTING DEVICES



Nuttall Sleet Wheels replace the standard trolley wheels and efficiently clean sleet coated wires.



Nuttall Sleet Scrapers hook over the trolley wheel — can be attached instantly, and clean the wire thoroughly. Don't wait for a sleet storm — order today.

R.D. NUTTALL COMPANY
PITTSBURGH  PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.



Nca

The Kaffir in hunting a wife is keen to observe outside evidences of inside qualifications.

Frinstance if a dusky dame has grass (nca) growing between her toes—she's lazy and will not make a good breadfruit winner.

So he passes on to the next.

Commendable—If you look long enough on anything to overthrow snap judgment, you can see evidences of service.

Of course, lots of carbon brushes have no toemarks of service. We've seen the poorest kind of brushes that you might take for Morganites—if the Morganite didn't have the 3-link trademark stamped on the outside of the brush as evidence of 3 times the service on the inside.

Morganite

Brush Co., Inc.

Main Office and Factory:

519 West 38th St., New York

DISTRICT ENGINEERS AND AGENTS

Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn Ave.
Cincinnati, Electrical Engineering & Mfg. Co., 607 Mercantile Library Building.
Cleveland, Electrical Engineering & Mfg. Co., 422 Union Building.
Philadelphia, Electric Power Equipment Corp., 412 North 18th St.
Baltimore, O. T. Hall, Sales Engineer, 1926 Edmondson Ave.
Revere, Mass., J. F. Drumme, 75 Pleasant Street.
Los Angeles, Special Service Sales Co., 502 Delta Building.
San Francisco, Special Service Sales Co., 202 Russ Building.
Toronto, Can., Railway & Power Engineering Corp., Ltd., 101 Eastern Ave.
Montreal, Can., Railway & Power Engineering Corp., Ltd., 326 Craig St., West.
Winnipeg, Can., Railway & Power Engineering Corp., Ltd., P. O. Box 325.

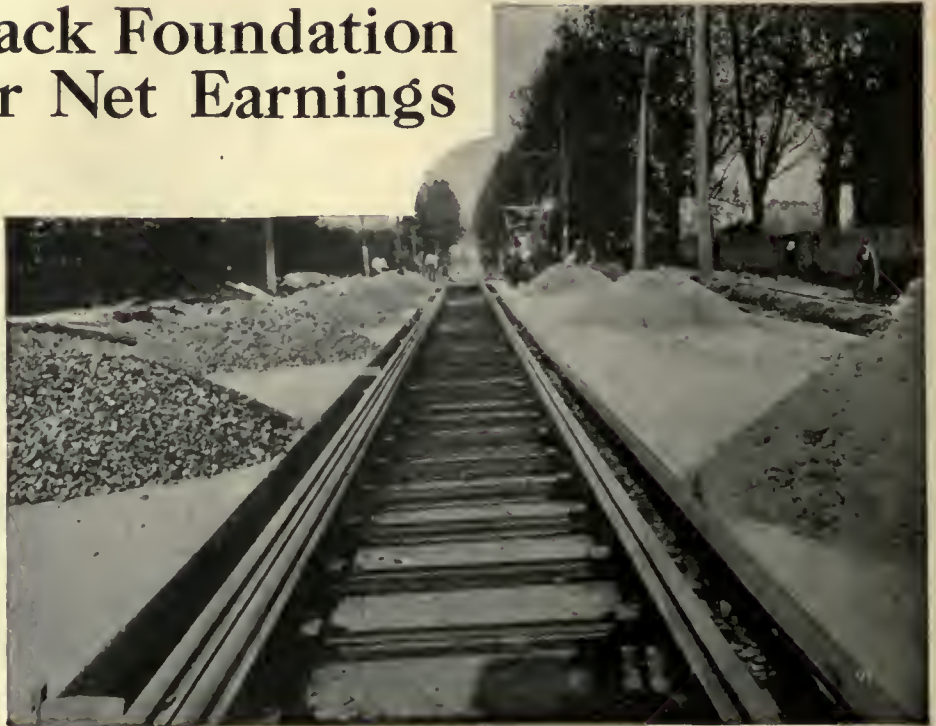
The Right Track Foundation Insures Better Net Earnings

This photograph shows the right track foundation, Dayton Resilient Ties embedded in concrete. Such a foundation insures permanency by reducing to a minimum some of the heaviest expenses of Street Railway Systems, viz., repairs to track, paving and rolling stock.

Resiliency and shock absorption, built in and made a part of the track foundation, insure permanency.

The facts that prove this are easy to understand and easier to get. *Simply drop us a line.*

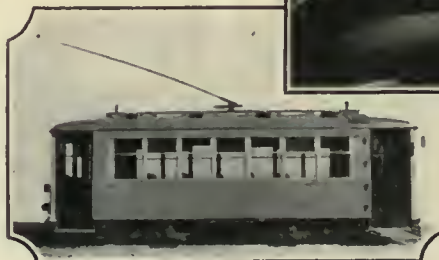
The Dayton
Mechanical Tie Co.
707 Commercial Building
DAYTON, OHIO



DAYTON *Resilient* TIE

The "PLYMETL-HASKELITE" Car has become the Industry's Standard

CARS being built and placed in service on lines operated by Day & Zimmerman, Inc., in Ohio and Pennsylvania, represent the furthest advance in the design of car body construction. A special form of roof frame has resulted from the use of HASKELITE roofs, without headlinings. Side panels are of PLYMETL without inner linings. This form of construction reduces the weight to a minimum consistent with perfect safety, and ample strength. The outstanding advantages of this form of construction are reduced operating expense, reduced wear and tear on the car, greater riding comfort, better heat insulation and ease and economy of applying and maintaining a high quality finish.



One of twenty cars built by G. C. Kuhlman Co. for the Columbus Newark and Zanesville Electric Co., Zanesville, O. Operated by Day & Zimmerman, Inc.

Have you seen our Blue Print and Data Book? It's Free!

HASKELITE MANUFACTURING CORPORATION, 133 W. Washington St., CHICAGO, ILL.



Reg. U. S. Pat. Office
Incandescent Lamp Cord

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE
AND CABLE

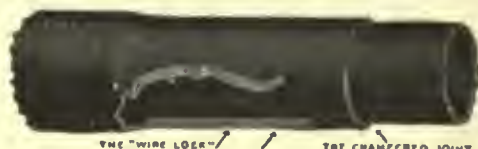
PAPER INSULATED
UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 179 Federal; Chicago, 113 W. Adams;
Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

ELRECO TUBULAR POLES



COMBINE

Lowest Cost

Least Maintenance

Lightest Weight

Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO

New York City, 30 Church Street

THE WORLD'S STANDARD

"IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.
Irvington, N. J.

Sales Representatives in the Principal Cities

We are prepared

to handle any high grade proposition where
VARNISHED CAMBRIC
Wires and Cables
are required.

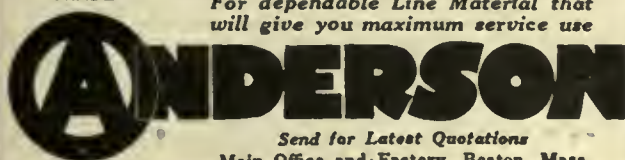
When using quality Wires and Cables use quality Tapes.
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes.

THE OKONITE CO., Passaic, N. J.
Incorporated 1884



Sales Offices: New York—Atlanta—
Pittsburgh—San Francisco.
Agents: Central Electric Co., Chicago,
Ill.; Pettibell-Andrews Co., Boston,
Mass.; The F. D. Lawrence Electric
Co., Cincinnati, Ohio; Novelty Elec-
tric Co., Philadelphia, Pa.
Canadian Representatives: Engineering
Materials Limited, Montreal.

TRADE



MARK

For dependable Line Material that
will give you maximum service use

Send for Latest Quotations
Main Office and Factory, Boston, Mass.



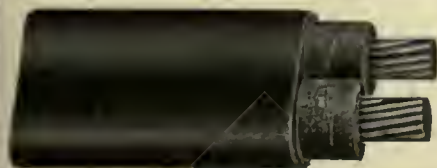
ELECTRICAL WIRES AND CABLES

John A. Roebbling's Sons Company
Trenton, New Jersey

J-1707

Chapman Automatic Signals

Charles N. Wood Co., Boston



Standard
Underground
Cable Co.

General Offices
Pittsburgh, Pa.
Branches in all
Principal cities

ANACONDA TROLLEY WIRE

ANACONDA COPPER
MINING COMPANY
Conway Building, Chicago, Ill.

THE AMERICAN
BRASS COMPANY
General Offices: Watertown, Co.

HUBBARD TURNBUCKLES

Made in three
types, Eye and Eye,
Eye and Hook and
Eye and Cleave.



Double-Dip Has
Galvanized the
Hubbard Way.

Type B, Eye and Hook

HUBBARD & COMPANY
PITTSBURGH CHICAGO

AUTOMATIC SIGNALS

Highway Crossing Bells
Headway Recorders
Flasher Relays

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.



Shaw Lightning Arresters

Standard in the Electric Industries
for 35 years

Henry M. Shaw

150 Coit St., Irvington, Newark, N. J.

Arc Weld Rail Bonds

AND ALL OTHER TYPES
Descriptive Catalogue Furnished

American Steel & Wire Company

Chicago
New York
Boston
Cleveland
Pittsburgh
Denver
U. S. Steel Products Co.
San Francisco

Los Angeles

Portland

Seattle

'CARNEGIE'
for
**WHEELS
AXLES
RAILS
CROSS TIES**

Carnegie Steel Company
PITTSBURGH, PENNA.



Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY
Johnstown, Pa.

Sales Offices:

Atlanta Chicago Cleveland New York
Philadelphia Pittsburgh

Pacific Coast Representatives:
United States Steel Products Company
Portland San Francisco

Los Angeles Seattle

Export Representatives:
United States Steel Products Company, New York, N. Y.

BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of

Special Work for Street Railways

Frogs, Crossings, Switches and Mates

Turnouts and Cross Connections

Kerwin Portable Crossovers

Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

R. A. HEGEMAN, Jr., President C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and
Change Maker
The Aluminum Field Coils
Walter Tractor Snow Plows
Cutler-Hammer Electric
Heaters
Pittsburgh Forge & Iron
Co.'s Products
Genesco Paint Oils
E. Z. Car Control Corpora-
tion's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfr. Co.'s
Single and Double Deck
Buses

Economy Electric Devices
Co.'s Power Saving and
Inspection Meters
Anglo-American Varnish Co.,
Varnishes, Enamels, etc.
Gillmer Multiple Safety Slep
Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co.,
Springs
Turnstile Car Corporation's
Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

GODWIN Steel Paving Guards

*Adapted to all
types of rails
and paving*



Proven by service
to economically
prevent seepage
and disintegration
of street railway
paving.

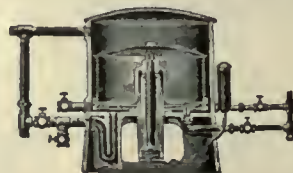
Write for Illustrated Catalog No. 20.

W. S. GODWIN CO., Inc.
RACE & McCOMAS STS., BALTIMORE, MD.

Turbine driven Reclaiming Machine

saves

Oil and Wiping Waste



The Oil & Waste Saving Machine Co.

1509 Real Estate Trust Bldg., Philadelphia, Pa.
Dept. D.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of
Water Tube Boilers
of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building



WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAYANA, CUBA, Calle de Aguilar 104
SAN JUAN, PORTO RICO, Royal Bank Building

SEVEN WORKS
RAMAPO-AJAX-ELLIOT
HILLBURN, NEW YORK
NIAGARA FALLS, N.Y.
CHICAGO, ILLINOIS
EAST ST. LOUIS, ILL.
PUEBLO, COLORADO
STOUTS, WISCONSIN
NIAGARA FALLS, ONT.
CANADA

Ramapo Ajax Corporation
RACOR
RAMAPO AUTOMATIC
RETURN SWITCH STANDS
FOR PASSING SIDINGS
TEE RAIL SPECIAL WORK
MANGANESE CONSTRUCTION
SALES OFFICES AT ALL WORKS
Main Office, HILLBURN, N.Y.

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines,
Condensers, Gas and Oil Engines, Air Compressors,
Air Brakes

OXYGEN, ACETYLENE, HYDROGEN for cutting, welding, etc.

Quick shipment and low prices also on cylinders, valves,
torches, regulators and supplies.

INTERNATIONAL OXYGEN COMPANY

Main Offices: Newark, N. J.
Branch Offices: New York Pittsburgh Toledo



ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed.
Up-to-date and economical.

Alumino-Thermic Corp., Roselle Park, N. J.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill
differ only in magnitude: small orders command our utmost care
and skill just as do large orders. CAMERON quality applies to
every coil or segment that we can make, as well as to every
commutator we build. That's why so many electric railway men
rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut



Car Heating and Ventilation

are two of the winter problems that you must
settle without delay. We can show you how
to take care of both, with one equipment.
Now is the time to get your cars ready for
next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

RAILWAY UTILITY COMPANY

CAR COMFORT WITH
UTILITY

HEATERS
REGULATORS
VENTILATORS

141-151 West 22d St.
Chicago, Ill.

Write for
Catalogue

1328 Broadway
New York, N. Y.

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts

Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We
carry 40 different sizes of case hardened pins in stock. Samples
furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

NEW and RELAYING RAILS

1 TON OR 1000

TRACK EQUIPMENT

L-B FOSTER CO.
PITTSBURGH - PENNSYLVANIA

RAIL ACCESSORIES

NEW YORK - JERSEY CITY - PHILADELPHIA - HAMILTON, O.

*Only reliable products
can be continuously
advertised*

HORNE & EBLING CORPORATION

50 CHURCH ST.,

NEW YORK, N. Y.

Brass Hardware
For Cars and Buses

Sterling Trolley Bases
and Brakes

Motor and Controller
Parts

Mall. Iron and Brass
Castings





N-L Type "AA"
Bus Ventilator

"Superior Ventilation"

Perfect ventilation of cars and buses pays—in cold, cash profits. In cold weather, passengers like warm air—if it is fresh. But next to bad air, they dislike drafts.

N-L Ventilators give a complete change of air many times an hour, without drafts. No snow, rain or dust can get in. Now used by leading street railways and bus body builders.



"Superior Ventilation" describes them fully. Write for a copy.

The Nichols-Lintern Co.

7960 Lorain Ave. Cleveland, Ohio
Canadian Representative: Railway & Power Eng. Corp., Ltd.,
133 Easter Ave., Toronto

"Longwear" Pins and Bushings Hard—Accurate—Uniform



Renewal Materials
for Peckham and
other Trucks
Castings—Forgings
Springs

E.G. Long Company

50 Church Street, New York, N. Y.

Play for safety—
plus resiliency—
plus long life

By specifying
FORT PITT SPRINGS

FORT PITT SPRING &
MFG. CO.
Pittsburgh, Pa.



HALE-KILBURN CAR SEATS

For Every Class of Service

General Offices and Works: Philadelphia

Offices: New York, Chicago, St. Louis, Washington, San Francisco

PROVIDENCE FENDERS H-B LIFE GUARDS

The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No.
478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

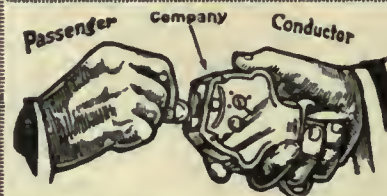
Let Us Tell You of Our Especially Designed Fare Box for the

ONE MAN CAR

THE CLEVELAND FARE BOX COMPANY

Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd., Preston, Ontario



Direct
Automatic
Registration
By the
Passengers

Rooke Automatic
Register Co.
Providence, R. I.



Gets Every Fare
**PEREY TURNSTILES
or PASSIMETERS**

Use them in your Prepayment Areas and
Street Cars

Perey Manufacturing Co., Inc.
101 Park Avenue, New York City

100 New Users in the Last Nine Months
KASS SAFETY TREADS

HIGH
in efficiency and lasting qualities
LOW

in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago



Electrical Insulation and Headlinings
THE PANELYTE COMPANY, Trenton, N. J.

SEARCHLIGHT SECTION

POSITIONS VACANT

ACTIVE, ambitious young man wanted for the position of street and interurban railway superintendent. Must have had technical training for electrical engineering and experience in operating responsibility. Must furnish references and complete statement of experience. An excellent executive opportunity with rapidly growing street and interurban railway system in the Middle West. P-772, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SPECIAL track work draftsmen wanted, preference given men having had experience with special track work manufacturer, but will consider one or two junior draftsmen familiar with trigonometry. State age, experience and salary in first letter. P-774, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

EXECUTIVE. Urban and interurban. Wide successful experience in all departments of construction and operation. PW-740, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

GENERAL shop foreman, city or interurban, 18 years' successful experience in maintenance operation and general shop management. At present employed. Personal reasons for change. PW-767, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

GENERAL superintendent, chief engineer, or superintendent of equipment, technical graduate, eighteen years' experience on construction, operation, maintenance of power, shops, track, line buses. Highly successful in handling men and materials and producing results, fine references. Personal reasons for desiring change. PW-768, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

MASTER mechanic, with broad experience and successful record backed by prominent executives in railway field, desires change. PW-769, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT of equipment thoroughly experienced and successful in the efficient maintenance of auto buses, city and interurban cars, desires to change. Confidential interview solicited. PW-771, Electric Railway Journal, 10th Ave. at 36th St., New York.

REPRESENTATIVE AVAILABLE

Eastern Sales Representation
The writer, having had fifteen years' practical sales experience in the railway and railroad industries, desires to take on additional sales accounts in the Eastern territory on a commission or other equitable basis. Address Room 1021, 165 Broadway, New York.

WANTED TO BUY

Scrap and Relaying Rails, Trolley and Feed Wire

We are interested in buying: Entire Trolley Roads and Power Plants for Dismantling Purposes.

THE S. SNYDER CORPORATION

14 to 21 Mart Place, Rochester, N. Y.
N. Y. Office—721 Knickerbocker Bldg.

WE WANT TO BUY

30—West. 306-C.V.-4

MOTORS

Have you any to offer?

ELECTRIC EQUIPMENT CO.

Commonwealth Bldg., Philadelphia, Pa.

1200 Tons 70 lb. ASCE

Relaying Rails

Strictly First Class
With Angle Bars

ZELNICKER IN ST. LOUIS

Cars—Locomotives—Hoists—Etc.



**In Small Lots
As Well As Large**

THERE is a class of rail buyers, occasionally in need of only small tonnages, who are paying a premium on their purchases elsewhere because they believe that we do not seek their patronage.

We maintain a large organization to give efficient service on small orders. Our tremendous volume gives us unequalled buying power and saves our clients money regardless of the tonnage required.

Immense stocks at strategic distributing points provide complete assortments near you. This adds a saving in freight to our already unbeatable prices.

Next time you need rails, let us know your requirements.

We guarantee the same prompt, efficient service to all.

HYMAN-MICHAELS COMPANY

"The House of Dependable Service"

122 South Michigan Avenue, Chicago

**Dealers in New and Relaying Rails,
Locomotives and Railway Equipment**

District Offices: New York, Woolworth Bldg.;

St. Louis, Railway Exchange Bldg.; Pittsburgh, First Nat'l Bank Bldg.;

San Francisco, 234 Steuart St.

Yards: St. Louis, East Chicago, Ind., McKee's Rocks, Pa., San Francisco.

Cable Address: "Hymanmikel"

World's Largest Distributors of Rails

FOR SALE: The following gears can be disposed of for immediate delivery:

Type	Teeth	Bore	Solid or Split	No. Gears
GE-70 and 80.....	71	5.485"	solid	124
GE-70 and 80.....	71	5.500"	split	20
GE-1000.....	67	4.870"	solid	9
GE-1000.....	67	4.500"	split	2
GE-1000.....	67	4.000"	split	2
GE- 800.....	69	4.000"	split	1
GE- 74.....	67	6.000"	split	9

If interested, please communicate with

The Milwaukee Electric Railway & Light Company

Purchasing Agent

Public Service Building, Milwaukee, Wisconsin

FIELD COILS

in stock

Over 1000 new coils made by General Electric Co. and Westinghouse Co., various types for immediate shipment. 20% less than manufacturer's present day quotations.

Transit Equipment Company

Cars—Motors

501 Fifth Avenue, New York

Relaying Rails

NEW RAILS - ACCESSORIES

*Buy Guaranteed
Relaying Rails
and Save 30%
to 50%*

1 Ton or 1000

LB FOSTER CO.

PITTSBURGH, PA. NEW YORK CITY
JERSEY CITY - PHILADELPHIA - HAMILTON, C.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

- Advertising, Street Car**
Collier, Inc., Barron G.
- Anchors, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Armature Shop Tools**
Elec. Service Supplies Co.
- Automatic Return Switch**
Stands
Ramapo Ajax Corp.
- Automatic Safety Switch**
Stands
Ramapo Ajax Corp.
- Axles**
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Westinghouse E. & M. Co.
- Axles, Car Wheels**
Bethlehem Steel Co.
- Badges and Buttons**
Elec. Service Supplies Co.
International Register Co., The
- Bearings and Bearing Metals**
Bemis Car Truck Co.
Brill Co., J. G., The
General Electric Co.
More-Jones Brass & Metal Co.
Westinghouse E. & M. Co.
- Bearings, Center and Roller**
Side
Stucki Co., A.
- Bells and Gongs**
Brill Co., The J. G.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
- Bearings, Roller**
Norma-Hoffman Bearings Corp.
- Boilers**
Babcock & Wilcox Co.
- Bonding Apparatus**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
- Bonds, Rail**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Boxes, Switch**
Johns-Pratt Co.
- Brackets and Cross Arms**
(See also Fuses, Ties, Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
- Brake Adjusters**
Brill Co., The J. G.
National Ry. Appliances Co.
Westinghouse Tr. Br. Co.
- Brake Shoes**
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
- Brakes, Brake Systems and Brake Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
Westinghouse Tr. Br. Co.
- Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co., Inc.
Westinghouse E. & M. Co.
- Brushes, Graphite**
Morganite Brush Co., Inc.
- Buses, Motor**
Brill Co., The J. G.
International Motor Co.
- Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.
Long Co., E. G.
- Cables**
(See Wires and Cables)
- Cambric Tapes, Yellow and Black Varnish**
Irvington Varnish & Ins. Co.
- Carbon Brushes (See Brushes, Carbon)**
- Cars, Dump**
Brill Co., J. G., The
Differential Steel Car Co.
- Car Lighting Fixtures**
Elec. Service Supplies Co.
- Car Panel Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.
- Cars, Passenger, Freight, Express, etc.**
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliances Co.
Wason Mfg. Co.
- Cars, Gas, Rail**
Brill Co., J. G., The
- Cars, Second Hand**
Electric Equipment Co.
Transit Equipment Co.
- Cars, Self-Propelled**
Brill Co., J. G., The
General Electric Co.
- Car Wheels, Rolled Steel**
Bethlehem Steel Co.
- Castings, Brass, Composition or Copper**
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.
- Castings, Gray Iron and Steel**
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
- Castings, Malleable and Brass**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
Horne & Ebling Corp.
- Catchers and Retrievers, Trolley**
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
- Catenary Construction**
Archbold-Brady Co.
- Ceilings, Plywood, Panels**
Haskelite Mfg. Co.
- Change Carriers**
Cleveland Fare Box Co.
- Circuit-Breakers**
Anderson, A. & J. M. Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Clamps and Connectors for Wires and Cables**
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Cleaners and Scrapers Track**
(See also Snow-Flows, Sweepers and Brooms)
Brill Co., The J. G.
- Clusters and Sockets**
General Electric Co.
- Coal and Ash Handling (See Conveying and Hoisting Machinery)**
- Coil Banding and Winding Machines**
Elec. Service Supplies Co.
- Colla Armature and Field**
General Electric Co.
Westinghouse E. & M. Co.
- Colla, Choke and Klinking**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Coln Counting Machines**
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.
- Coln Sorting Machines**
Cleveland Fare Box Co.
- Coln Wrappers**
Cleveland Fare Box Co.
- Commutator Slotters**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Commutator Truing Devices**
General Electric Co.
- Commutators or Parts**
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Compressors, Air**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Tr. Br. Co.
- Condenser Papers**
Irvington Varnish & Ins. Co.
- Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Connectors, Solderless**
Frankel Connector Co.
Westinghouse E. & M. Co.
- Connectors, Trailer Car**
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.
- Controllers or Parts**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Controller Regulators**
Elec. Service Supplies Co.
- Controlling Systems**
General Electric Co.
Monitor Controller Co.
Westinghouse E. & M. Co.
- Converters, Rotary**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Copper Wire**
Anaconda Copper Mining Co.
- Cord, Bell, Trolley, Register**
Brill Co., The J. G.
Elec. Service Supplies Co.
Internatl Register Co., The
Roebbling's Sons Co., John A.
Samson Cordage Works
- Cord Connectors and Couplers**
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
- Couplers, Car**
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Cross Arms (See Brackets)**
- Crossing Foundations**
International Steel Tie Co.
- Crossing, Frog & Switch**
Ramapo Ajax Corp.
- Crossing, Manganese**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Crossings**
Ramapo Ajax Corp.
- Crossings, Track (See Track, Special Work)**
- Crossings, Trolley**
Ohio Brass Co.
- Curialas and Curtain Fixtures**
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
- Dealer's Machinery**
Elec. Equipment Co.
Hyman-Michals Co.
Transit Equipment Co.
- Derailing Devices (See also Track Work)**
- Derailing Switches**
Ramapo Ajax Corp.
- Destination Signs**
Elec. Service Supplies Co.
- Detective Service**
Wish-Service, P. Edward
- Door Operating Devices**
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
St. Louis Car Co.
- Doors & Door Fixtures**
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Morton Mfg. Co.
- Doors, Folding Vestibule**
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
- Drills, Track**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
- Dryers, Sand**
Elec. Service Supplies Co.
- Ears**
Ohio Brass Co.
- Electrical Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebbling's Sons & Co., J. A.
- Electric Grinders**
Western Electric Co.
- Engineers, Consulting, Contracting and Operating**
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Buchanan & Layne Corp.
Bureau of Commercial Economics, Inc.
Byllesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holt, Engelhardt W.
Jackson, Walter
Ong, Joe R.
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.
- Engineering**
Equipment Engineering Co.
- Engines, Gas, Oil or Steam**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.
- Fare Boxes**
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry. Appliances Co.
- Fare Registers**
Ohmer Fare Register Co.
- Fences, Woven Wire and Fence Posts**
Amer. Steel & Wire Co.
- Fenders and Wheel Guards**
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
- Fibre and Fibre Tubing**
Westinghouse E. & M. Co.
- Field Colla (See Colla)**
- Flangeway Guards, Steel**
W. S. Godwin Co., Inc.
- Floodlights**
Elec. Service Supplies Co.
- Forgings**
Brill Co., J. G., The
- Frogs & Crossings, Tee Rail**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Frogs, Track (See Track Work)**
- Frogs, Trolley**
Ohio Brass Co.
- Fuses, Cartridge, Non-Refillable & High Voltage**
Johns-Pratt Co.
- Fuses, Cartridge, Refillable**
Johns-Pratt Co.
- Fuses and Fuse Boxes**
Consolidated Car Heat. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Fuses, Refillable**
General Electric Co.
Johns-Manville, Inc.
- Gaskets**
Westinghouse Tr. Br. Co.
- Gas Producers**
Westinghouse E. & M. Co.
- Gas-Electric Cars**
General Elec. Co.
Westinghouse E. & M. Co.
- Gates, Car**
Brill Co., The J. G.
- Gear Blanks**
Bethlehem Steel Co.
Brill Co., J. G., The
- Gear Cases**
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
- Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliances Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.
- Generating Sets, Gas-Electric**
General Electric Co.
- Generators**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Gilder Rails**
Bethlehem Steel Co.
Lorain Steel Co.
- Gong (See Bells and Gongs)**
- Greases (See Lubricants)**
- Grinders and Grind Supplies**
Indianapolis Switch & Frog Co.
- Guard Rail Clamps**
Ramapo Ajax Corp.
- Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.
- Guards, Trolley**
Elec. Service Supplies Co.
Ohio Brass Co.
- Harps, Trolley**
Elec. Service Supplies Co.
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.
- Headlights**
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
- Headlining**
Haskelite Mfg. Co.
Panelyte Co.
- Heaters, Rns**
Petty Co., N. A.
- Heaters, Car (Electric)**
Consolidated Car Heat. Co.
Gold Car Heat. & Ltr. Co.
Nat'l Ry. Appliances Co.
Smith Heater Co., Peter
- Heaters, Car, Hot Air and Water**
Elec. Service Supplies Co.
Smith Heater Co., Peter
- Hydraulic Machinery**
Allis-Chalmers Mfg. Co.
- Instruments Measuring, Testing and Recording**
Elec. Service Supplies Co.
General Electric Co.
Johns-Pratt Co.
Westinghouse E. & M. Co.
- Insulating Cloth, Paper and Tape**
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
- Stand, Underground Cable**
Westinghouse E. & M. Co.
- Insulating, Silk & Varnish**
Irvington Varnish & Ins. Co.
- Insulation (See also Paints)**
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Westinghouse E. & M. Co.
- Insulation Slots**
Irvington Varnish & Ins. Co.
- Insulators (See also Line Materials)**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.
- Insulator Pins**
Elec. Service Supplies Co.
Hubbard & Co.
- Jacks (See also Cranes, Hoists and Lifts)**
Elec. Service Supplies Co.
- Joints, Rail**
(See Rail Joints)
- Journal Boxes**
Bemis Car Truck Co.
Brill Co., J. G.
Fort Pitt Steel Castings Co.
- Junction Boxes**
Horne & Ebling Corp.
Std. Underground Cable Co.
- Lamps, Guards and Fixtures**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Arc & Incandescent**
(See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Signal and Marker**
Nichols-Lintern Co.
Ohio Brass Co.
- Lanterns, Classification**
Nichols-Lintern Co.

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

**COST MORE PER BRUSH
COST LESS PER CAR MILE**

W. J. Jeandron
345 Madison Avenue, New York

Pittsburgh Office: 634 Wabash Bldg.

Chicago Office: 1657 Monadnock Block

San Francisco Office: 525 Market Street

Canadian Distributors: Lyman Tube & Supply Co., Ltd.,
Montreal and Toronto

BRAKE SHOES

AERA Standards Brake Heads



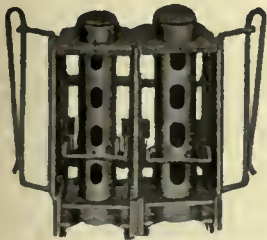
Diamond "S" Steel Back and Lug Shoes
best for all equipment.

Manufactured and sold under U. S.
Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York

332 So. Michigan Ave., Chicago

JOHNSON Universal Changer



Adjustable

The best changer on the market.
Can be adjusted by the conductor to
throw out a varying number of
coins, necessary to meet changes in
rates of fares.

Flexible

Each barrel a separate unit, permit-
ting the conductor to interchange
the barrels to suit his personal re-
quirements, and to facilitate the ad-
dition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.



Type R-11
Double Register

International Registers

Made in single and double
types to meet requirements
of service. For hand or foot,
mechanical or electric opera-
tion. Counters, car fittings,
conductors' punches.

Exclusive selling agents for
HEEREN ENAMEL BADGES.

The International Register Co.
15 South Throop Street, Chicago, Illinois

The Kalamazoo Trolley Wheels

have always been made of en-
tirely new metal, which accounts
for their long life **WITHOUT**
INJURY TO THE WIRE. Do
not be misled by statements of
large mileage, because a wheel
that will run too long will da-
mage the wire. If our catalogue
does not show the style you
need, write us—the **LARGEST**
EXCLUSIVE TROLLEY
WHEEL MAKERS IN THE
WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.



We make a specialty of
**ELECTRIC RAILWAY
LUBRICATION**

We solicit a test of TULC
on your equipment

The Universal Lubricating Co.
Cleveland, Ohio

Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

- Lightning Protection**
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.
- Line Material (See also Brackets, Insulators, Wires, etc.)**
Archbold-Brady Co.
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Locomotives, Electric**
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
- Lubricating Engineers**
Universal Lubricating Co.
- Lubricants, Oil and Grease**
Universal Lubricating Co.
- Manganese Parts**
Bemis Car Truck Co.
- Manganese Steel Castings**
Wm. Wharton, Jr. & Co.
- Manganese Steel Guards**
Ralls
Ramapo Ajax Corp.
- Manganese Steel, Special Track Work**
Bethlehem Steel Co.
- Manganese Steel Switches**
Frogs & Crossings
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Meters (See Instruments)**
- Molding, Metal**
Allis-Chalmers Mfg. Co.
- Motor Buses (See Buses, Motor)**
- Motors, Electric**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.
- Motors and Generators, Sets**
Allis-Chalmers Mfg. Co.
General Electric Co.
- Motorists' Seats**
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
Wood Co., Chas. N.
- Nuts and Bolts**
Barbour-Stockwell Co.
Bemis Car Truck Co.
Bethlehem Steel Co.
Hubbard & Co.
- Oils (See Lubricants).**
- Omnibuses (See Buses, Motor)**
- Oxygen**
International Oxygen Co.
- Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)**
- Packing**
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
- Paints and Varnishes (Insulating)**
Irvington Varnish & Ins. Co.
- Paints and Varnishes for Woodwork**
National Ry. Appliance Co.
- Pavement Breakers**
Ingersoll Rand Co.
- Paving Guards, Steel**
W. S. Godwin Co., Inc.
- Paving Material**
Amer. Br. Shoe & Fdy. Co.
- Pickup, Trolley Wire**
Elec. Service Supplies Co.
Ohio Brass Co.
- Pinion Pullers**
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.
- Pinions (See Gears)**
- Pins, Case Hardened, Wood and Iron**
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.
- Pipe Fittings**
Westinghouse Tr. Brake Co.
- Planers (See Machine Tools)**
- Plates for Tee Rail Switches**
Ramapo Ajax Corp.
- Pliers, Rubber Insulated**
Elec. Service Sup. Co.
- Pole Line Hardware**
Bethlehem Steel Co.
Ohio Brass Co.
- Poles, Metal Street**
Elec. Ry. Equipment Co.
Hubbard & Co.
- Pole Reinforcing**
Hubbard & Co.
- Poles & Ties Treated**
Bell Lumber Co.
- Poles, Ties, Posts, Piling & Lumber**
Bell Lumber Co.
- Poles, Trolley**
Bell Lumber Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.
- Poles, Tubular Steel**
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
- Potholes**
Okonite Co.
- Power Saving Devices**
National Ry. Appliance Co.
Railway Improvement Co.
- Pressure Regulators**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Pumps**
Allis-Chalmers Mfg. Co.
- Pumps Vacuum**
Ingersoll Rand Co.
- Punches, Ticket**
Intern'l Register Co., The
Wood Co., Chas. N.
- Rail Braces & Fastenings**
Ramapo Ajax Corp.
- Rail Filler**
Philip Carey Co.
- Rail Grinders (See Grinders)**
- Rail Joints**
Carnegie Steel Co.
- Rail Joints—Welded**
Lorain Steel Co.
- Rails, Relaying**
Foster Co., L. B.
Hyman-Michaels Co.
- Rails, Steel**
Bethlehem Steel Co.
Carnegie Steel Co.
Foster Co., L. B.
- Railway Paving Guards, Steel**
Godwin Co., Inc., W. S.
- Railway Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.
- Rattan**
Brill Co., The J. G.
Elec. Service Supplies Co.
McGuire-Cummings Mfg. Co.
- Reelers, Waste & Oil**
Oil & Waste Saving Machine Co.
- Registers and Filings**
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Rooke Automatic Register Co.
- Reinforcement, Concrete**
Amer. Steel & Wire Co.
- Repair Shop Appliances (See also Coll Handling and Winding Machines)**
Elec. Service Supplies Co.
- Repair Work (See also Coils)**
General Electric Co.
Westinghouse E. & M. Co.
- Replacers, Car**
Elec. Service Sup. Co.
- Resistances**
Consolidated Car Heat. Co.
- Resistance, Wire and Tube**
General Electric Co.
Westinghouse E. & M. Co.
- Retrievers, Trolley (See Catchers and Retrievers, Trolley)**
- Rheostats**
General Electric Co.
Westinghouse E. & M. Co.
- Roofing Car**
Pantastote Co., Inc.
- Roofs**
Haskelite Mfg. Co.
- Sanders, Track**
Brill Co., The J. G.
Elec. Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
- Sash Fixtures, Car**
Brill Co., The J. G.
Horne & Ebling Corp.
- Scrapers, Track (See Cleaners and Scrapers, Track)**
- Screw Drivers, Rubber Insulated**
Elec. Service Sup. Co.
- Seats, Bus**
Brill Co., J. G., The
Heywood-Wakefield Co.
- Seats, Car (See also Rattan)**
Brill Co., The J. G.
Heywood-Wakefield Co.
- Seating Materials**
Brill Co., J. G.
Heywood-Wakefield Co.
- Second Hand Equipment**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.
- Shades, Vestibule**
Brill Co., The J. G.
- Shovels**
Brill Co., The J. G.
Hubbard & Co.
- Side Bearings (See Bearings, Center and Side)**
- Signals, Car Starting**
Consolidated Car Heat. Co.
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.
- Signals, Indicating**
Nichols-Lintern Co.
- Signal Systems, Highway Crossing**
Nachod Signal Co., Inc.
Wood Co., Chas. N.
- Signal Systems, Block**
Elec. Service Sup. Co.
Nachod Signal Co., Inc.
- Slack Adjusters (See Brake Adjusters)**
- Sleeve Wheels and Cutters**
Anderson Mfg. Co., A. & J. M.
- Soldering and Brazing Apparatus (See Welding Processes and Apparatus)**
Irvington Varnish & Ins. Co.
- Solderless, Connector**
Frankel Connector Co.
- Special Adhesive Papers**
Irvington Varnish & Ins. Co.
- Special Trackwork**
Bethlehem Steel Co.
Lorain Steel Co.
- Spikes**
Amer. Steel & Wire Co.
- Splicing Compounds**
Westinghouse E. & M. Co.
- Splicing Sleeves (See Clamps and Connectors)**
- Springs, Car and Truck**
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
- Sprinklers, Track and Road**
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
- Steel and Steel Products**
Carnegie Steel Co.
- Steps, Car**
Brill Co., J. G., The
Norton Mfg. Co.
- Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse E. & M. Co.
- Stop Signals**
Nichols-Lintern Co.
- Storage Batteries (See Batteries, Storage)**
- Strain, Insulators**
Anderson, A. & J. M. Mfg. Co.
Ohio Brass Co.
- Strand**
Roebbling's Sons Co., J. A.
- Subway Boxes**
Johns-Pratt Co.
- Superheaters**
Babcock & Wilcox Co.
- Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**
- Switches, Safety**
Johns-Pratt Co.
- Switches, Selector**
Nichols-Lintern Co.
- Switches, Tee Rail**
Ramapo Ajax Corp.
- Switches, Track (See Track Special Work)**
- Switches and Switchboards**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Tapes and Cloths (See Insulating Cloth, Paper and Tape)**
- Tee Rail Special Track Work**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Telephones and Parts**
Elec. Service Supplies Co.
- Terminals, Cable**
Std. Underground Cable Co.
- Testing Devices, Meter**
Johns-Pratt Co.
- Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**
- Thermostats**
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter
- Ticket Choppers & Destroyers**
Elec. Service Supplies Co.
- Ties, Mechanical**
Dayton Mechanical Tie Co.
- Ties and Tie Rods, Steel**
Barbour-Stockwell Co.
Carnegie Steel Co.
W. S. Godwin Co., Inc.
International Steel Tie Co.
- Ties, Wood Cross (See Poles, Ties, Posts, etc.)**
- Tires**
U. S. Rubber Co.
- Tool Steel**
Bethlehem Steel Co.
- Tools, Track & Miscellaneous**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Hubbard & Co.
- Torches, Acetylene (See Cutting Apparatus)**
- Towers and Transmission Structures**
Archbold-Brady Co.
Westinghouse E. & M. Co.
- Trackless Trolley Cars**
Brill Co., J. G., The
- Track, Special Work**
Barbour-Stockwell Co.
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Transfer (See Tickets)**
- Transfer Tables**
American Bridge Co.
- Transformers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Treads, Safety, Stair, Car Step**
Morton Mfg. Co.
- Trolley Bases**
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Ohio Brass Co.
- Trolley Bases, Retrieving**
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.
- Trolley Buses**
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.
- Trolley Material, Overhead**
Anderson, A. & J. M. Mfg. Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
- Trolley Wheel Bushings**
More-Jones Brass & Metal Co.
- Trolley Wheels & Hubs**
More-Jones Brass & Metal Co.
Thornton Trolley Wheel Co.
- Trolley Wheels (See Wheels, Trolley)**
- Trolley Wire**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebbling's Sons Co., J. A.
- Trucks, Car**
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
Taylor Elec. Truck Co.
- Tubing, Yellow & Black**
Flexible Varnish
Irvington Varnish & Ins. Co.
- Turbines, Steam**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Turbines, Water**
Allis-Chalmers Mfg. Co.
- Turnstiles**
Elec. Service Supplies Co.
Percy Mfg. Co., Inc.
- Valves**
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Varnished Papers & Silks**
Acme Wire Co.
Irvington Varnish & Ins. Co.
- Ventilators, Car**
Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
- Welded Rail Joints**
Alumino-Thermic Corp.
Ohio Brass Co.
- Welders, Portable Electric**
Ohio Brass Co.
- Welding and Cutting Tools**
International Oxygen Co.
- Welding Processes and Apparatus**
Alumino-Thermic Corp.
General Electric Co.
International Oxygen Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Wheel Guards (See Feeders and Wheel Guards)**
- Wheel Presses (See Machine Tools)**
- Wheels, Car, Cast Iron**
Bemis Car Truck Co.
Carnegie Steel Co.
- Wheels, Wrought Steel**
Carnegie Steel Co.
- Wheels, Trolley**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works.
- Whistles, Air**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Wire Rope**
Roebbling's Sons Co., J. A.
- Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Roebbling's Sons Co., J. A.
Westinghouse E. & M. Co.
Std. Underground Cable Co.

*Safety cars
make
safer dividends
when equipped with
"Tool Steel" gears + pinions*

Tool Steel Quality

The Tool Steel
Gear and Pinion Co.
CINCINNATI, O.



"Differential Two-Car Train. Traller dumping load clear of trench."

DIFFERENTIAL CARS

Standard on Fifty Railways for

Track Maintenance	Track Construction
Ash Disposal	Hauling Crossties
Placing Ballast	Disposal of Waste
Coal Hauling	Snow Disposal
Concrete Materials to the Job	
Excavated Material to the Dump	

For Economy

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION
CAR-WHEEL TRUCK and TRACTOR

THE DIFFERENTIAL STEEL CAR CO.

Findlay, Ohio, U. S. A.

McGuire-Cummings Manufacturing Co.

General Offices:
111 W. Monroe St., Chicago, Ill.

Street Cars
Trucks
Snow Sweepers



Tests Prove That Fewer Inspections Are Required

This fact about the Thornton Side Bearing Trolley Wheel is due to the method of lubrication and the extremely long life of the bearings. The construction insures a perfectly balanced wheel and freedom from vibration and noise. Users are getting over 50,000 miles from the side bearings. Write for Bulletin.

Thornton Trolley Wheel Co.
Incorporated
Ashland, Kentucky



MORE-JONES
"TIGER-BRONZE"
AXLE
AND ARMATURE
BEARINGS

*Not always the cheapest, but ever
lowest in ultimate cost*

MORE-JONES BRASS & METAL CO.
St. Louis, Missouri.

ALPHABETICAL INDEX TO ADVERTISEMENTS

Page	Page	Page	Page
A		K	
Allis-Chalmers Mfg. Co.....	27	Kuhlman Car Co.....	35
Allison Co., J. E.....	19	L	
Alumino-Thermic Corp.	27	Le Carbone Co.....	31
Amer. Brake Shoe & Fdy. Co.,	31	Long, E. J., Co.....	28
American Car Co.....	35	Lorain Steel Co.....	26
American Electrical Works....	25	M	
American Steel & Wire Co.....	26	McGuire-Cummings Mfg. Co....	33
American Steel Foundries	20	More-Jones Brass & Metal Co..	33
Anaconda Copper Mining Co....	25	Monitor Controller Co.....	10
Anderson Mfg. Co., A. & J. M..	25	Morganite Brush Co., Inc.....	23
Archbold-Brady Co.....	19	Morton Mfg. Co.....	28
B		N	
Babcock & Wilcox Co.....	27	Nachod Signal Co.....	25
Barbour-Stockwell Co.....	26	National Brake Co.....	17
Beeler Organization	18	National Pneumatic Co., Inc..	11
Bell Lumber Co.....	34	National Ry. Appliance Co....	26
Bemis Car Truck Co.....	27	Nichols-Lintern Co.....	28
Bethlehem Steel Co.....	6	Nuttall Co., R. D.....	23
Brill Co., The J. G.....	35	O	
Buchanan & Layng Corp.....	19	Ohio Brass Co.....	5
Bureau of Comm. Economics,		Oil & Waste Saving Machine Co.	26
Inc.	19	Okonite Co., The.....	25
Byllesby & Co., H. M.....	18	Org, Joe R.....	18
C		P	
Cameron Electrical Mfg. Co...	27	Panelyte Co.....	28
Carey Co., Philip.....	Front Cover	Perey Mfg. Co., Inc.....	28
Carnegie Steel Co.....	26	Petry Co., N. A.....	19
Chillingworth Mfg. Co.....	34	Positions Wanted and Vacant..	29
Cleveland Fare Box Co.....	28	R	
Collier, Inc., Barron G.....	14	Railway Audit & Inspection Co.	19
Consolidated Car Fender Co...	28	Railway Utility Co.....	27
Consolidated Car Heating Co...	21	Ramapo Ajax Corp.....	27
D		Richey, Albert S.....	18
Day & Zimmermann, Inc.....	18	Robinson Co., Dwight P.....	18
Dayton Mech. Tie Co.....	24	Roebbling's Sons Co., John A...	25
Differential Steel Car Co., The..	33	Rooke Automatic Register Co..	28
E		S	
Electric Equipment Co.....	29	Samson Cordage Works	27
F		Sanderson & Porter	18
Electric Ry. Equipment Co.....		Searchlight Section	29
Electric Service Supplies Co....		Shaw, Henry M.....	25
G		Smith Heater Co., Peter.....	27
General Electric Co., 16, Back Cover		Standard Underground Cable Co..	25
Godwin Co., W. S., Inc.....		Star Brass Works.....	31
Gold Car Heating & Lig. Co... 28		Stevens & Wood, Inc.....	18
H		Stone & Webster	18
Hale-Kilburn Co.		Stucki Co., A.....	34
Haskellite Mfg. Co.....		T	
"Help Wanted" Ads.....		Thornton Trolley Wheel Co....	33
Hemphill & Wells.....		Tool Steel Gear & Pinion Co..	33
Holst, Englehard W.....		Transit Equipment Co.....	29
Horne & Ehling Corp.		U	
Hubbard & Co.....		Universal Lubricating Co.....	
Hyman-Michaels Co.		U. S. Rubber Co.....	
I		W	
International Motor Co.....		"Want" Ads.....	
International Oxygen Co.....		Wason Mfg. Co.....	
International Register Co., The.		Westinghouse Elec. & Mfg. Co..	
International Steel Tie Co., The.		West'gh'se Traction Brake Co..	
Irvington Varnish & Insulator Co.		White Eng. Corp., The J. G....	
J		Wish Service The P. Edw.....	
Jackson, Walter		Wood Co., Chas. N.....	
Jeandron, W. J.....		P	
Johnson & Co., Inc., J. R.....		Panelyte Co.....	
Johnson Fare Box Co.....		Perey Mfg. Co., Inc.....	
Johns-Pratt Co.....		Petry Co., N. A.....	
K		Positions Wanted and Vacant..	
Kuhlman Car Co.....		R	
L		Railway Audit & Inspection Co.	
Le Carbone Co.....		Railway Utility Co.....	
Long, E. J., Co.....		Ramapo Ajax Corp.....	
Lorain Steel Co.....		Richey, Albert S.....	
M		Robinson Co., Dwight P.....	
McGuire-Cummings Mfg. Co....		Roebbling's Sons Co., John A...	
More-Jones Brass & Metal Co..		Rooke Automatic Register Co..	
Monitor Controller Co.....		S	
Morganite Brush Co., Inc.....		Samson Cordage Works	
Morton Mfg. Co.....		Sanderson & Porter	
N		Searchlight Section	
Nachod Signal Co.....		Shaw, Henry M.....	
National Brake Co.....		Smith Heater Co., Peter.....	
National Pneumatic Co., Inc..		Standard Underground Cable Co..	
National Ry. Appliance Co....		Star Brass Works.....	
Nichols-Lintern Co.....		Stevens & Wood, Inc.....	
Nuttall Co., R. D.....		Stone & Webster	
O		Stucki Co., A.....	
Ohio Brass Co.....		T	
Oil & Waste Saving Machine Co.		Thornton Trolley Wheel Co....	
Okonite Co., The.....		Tool Steel Gear & Pinion Co..	
Org, Joe R.....		Transit Equipment Co.....	
P		U	
Panelyte Co.....		Universal Lubricating Co.....	
Perey Mfg. Co., Inc.....		U. S. Rubber Co.....	
Petry Co., N. A.....		W	
Positions Wanted and Vacant..		"Want" Ads.....	
R		Wason Mfg. Co.....	
Railway Audit & Inspection Co.		Westinghouse Elec. & Mfg. Co..	
Railway Utility Co.....		West'gh'se Traction Brake Co..	
Ramapo Ajax Corp.....		White Eng. Corp., The J. G....	
Richey, Albert S.....		Wish Service The P. Edw.....	
Robinson Co., Dwight P.....		Wood Co., Chas. N.....	
Roebbling's Sons Co., John A...		P	
Rooke Automatic Register Co..		Panelyte Co.....	
S		Perey Mfg. Co., Inc.....	
Samson Cordage Works		Petry Co., N. A.....	
Sanderson & Porter		Positions Wanted and Vacant..	
Searchlight Section		R	
Shaw, Henry M.....		Railway Audit & Inspection Co.	
Smith Heater Co., Peter.....		Railway Utility Co.....	
Standard Underground Cable Co..		Ramapo Ajax Corp.....	
Star Brass Works.....		Richey, Albert S.....	
Stevens & Wood, Inc.....		Robinson Co., Dwight P.....	
Stone & Webster		Roebbling's Sons Co., John A...	
Stucki Co., A.....		Rooke Automatic Register Co..	
T		S	
Thornton Trolley Wheel Co....		Samson Cordage Works	
Tool Steel Gear & Pinion Co..		Sanderson & Porter	
Transit Equipment Co.....		Searchlight Section	
U		Shaw, Henry M.....	
Universal Lubricating Co.....		Smith Heater Co., Peter.....	
U. S. Rubber Co.....		Standard Underground Cable Co..	
W		Star Brass Works.....	
"Want" Ads.....		Stevens & Wood, Inc.....	
Wason Mfg. Co.....		Stone & Webster	
Westinghouse Elec. & Mfg. Co..		Stucki Co., A.....	
West'gh'se Traction Brake Co..		T	
White Eng. Corp., The J. G....		Thornton Trolley Wheel Co....	
Wish Service The P. Edw.....		Tool Steel Gear & Pinion Co..	
Wood Co., Chas. N.....		Transit Equipment Co.....	



Phila. & West Chester Trac. Co's. New High-Speed Cars

Ten Center-entrance Center-exit cars, of the railway company's standard design, were recently delivered to the Philadelphia & West Chester Traction Co. These new cars, mounted on Brill High-speed Trucks, 27-MCB-2X, are noted for their smooth and comfortable riding action, to which their general popu-

larity with the public may be largely attributed.

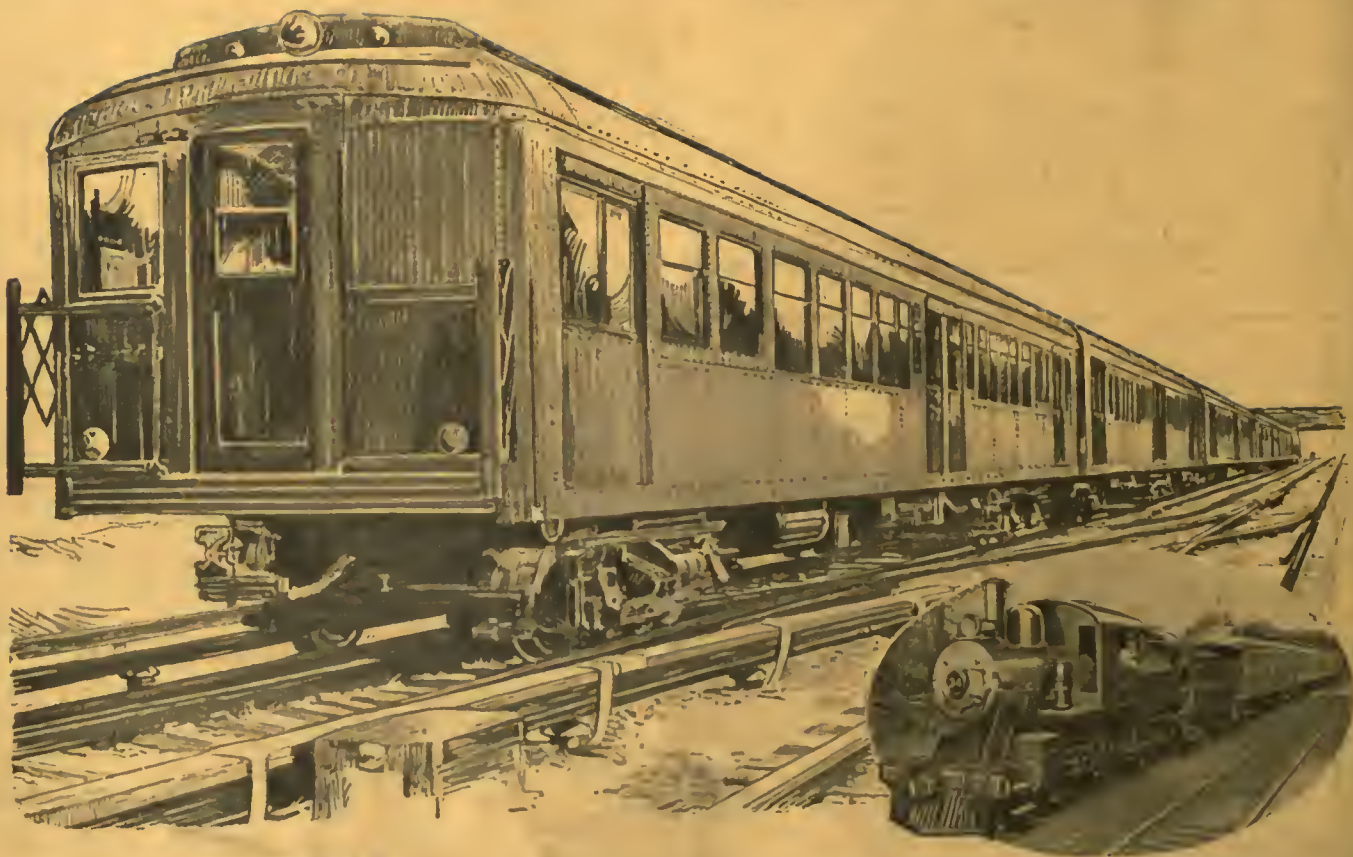
Seating accommodations are provided for 62 passengers; the cars measure 48 feet long overall, 8 ft. 7 in. wide over posts, and equipped with quadruple 50 H.P. motors weigh 59,000 lb.

Catalog No. 277 contains a complete line of modern transportation equipment.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
ST. LOUIS, MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.





Present Steam Equipment

Staten Island roads electrify to meet exacting traffic demands

In order to give their suburban passengers the most generous measure of comfort and speed, the Staten Island Rapid Transit Railway Company and Staten Island Railway Company, subsidiaries of the Baltimore & Ohio, are electrifying 34 track-miles.



200-h.p. direct current motors, type GE-282, with PC-10 Control were specified for this important electrification. The motors will operate at 600 volts.

Eighty steel cars, each seating 72 passengers, will be operated in multiple-unit trains at speeds up to 50 miles per hour. They will provide the reliable, fast and frequent service necessary to and from the New York municipal ferries and in connection with the ferries operated by the Baltimore & Ohio between Tottenville and Perth Amboy, N. J.

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN ALL LARGE CITIES

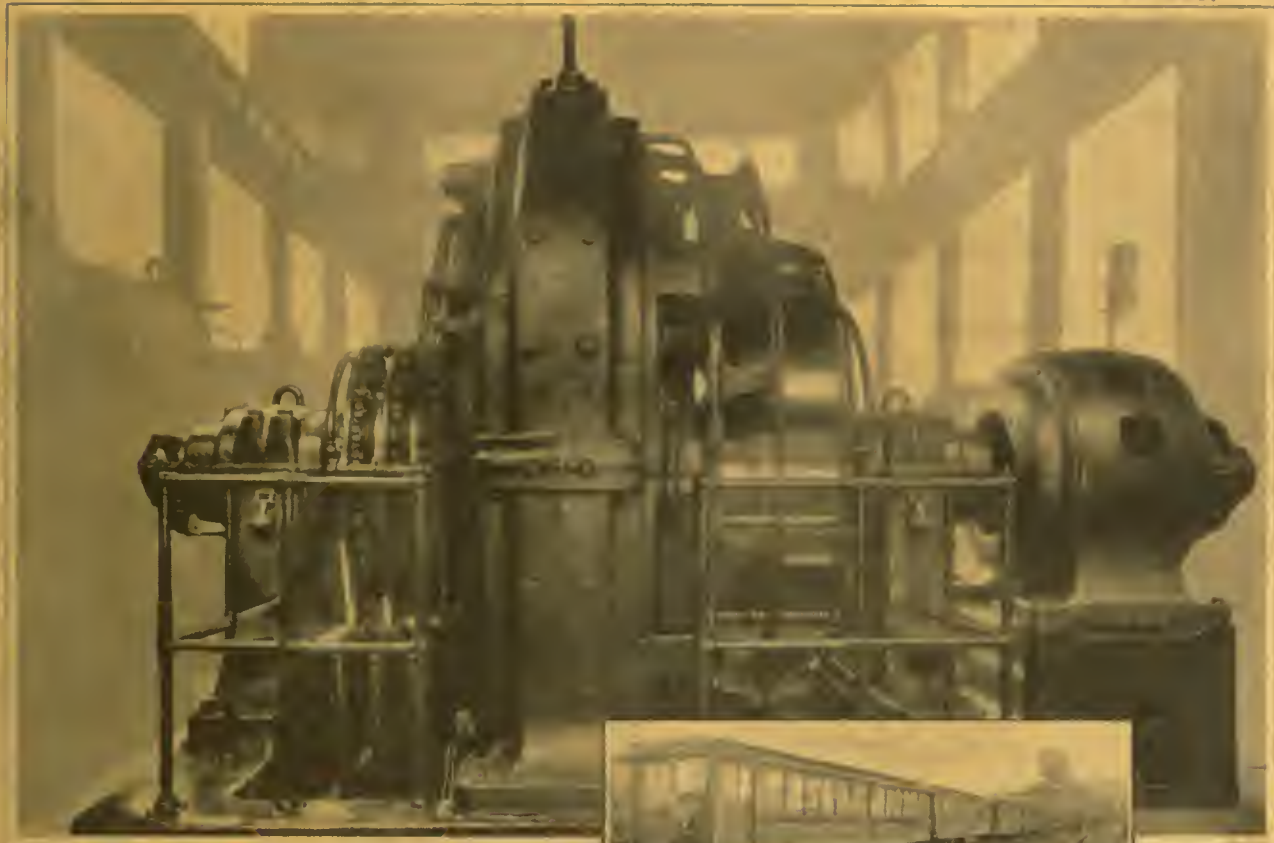
ELECTRIC RAILWAY JOURNAL

McGraw-Hill Company, Inc. Twenty Cents Per Copy

January 31, 1925

One of the I. R. T. rotaries—NCC-259 on the DC side, Ringsdorff on the AC, for reliable, uninterrupted service.

HOUSTON PUBLIC LIBRARY
LYCEUM AND COLUMBIC BRANCH
HOUSTON, TEXAS.



A ten-car I. R. T. train such as amazes most traction men

Where the nickel rides farthest

For a nickel one can ride from Brooklyn to Harlem on the Interboro Rapid Transit Lines—the biggest nickel's worth in transportation today, given to the largest crowds by the longest trains, and with the aid of National Pyramid Brushes that have demonstrated their complete fitness for severe traction motor service.

In supplying power for these traction motors the rotary converter pictured here uses National Grade 259 Brushes on the DC side, Ringsdorff on the AC. Peak after peak, day and night these brushes help guarantee the remarkable service rendered by the I.R.T.

For I.R.T. service is a series of

peaks. Morning workers—baseball fans—convention crowds—matinee-goers—evening home-seekers—two theatre rushes nightly—these are some of the I.R.T. daily responsibilities which require the utmost reliability in equipment.

Our Sales Engineers are at your service.

National Pyramid Brushes

Manufactured and guaranteed by

NATIONAL CARBON COMPANY, INC.

Cleveland, Ohio Carbon Sales Division San Francisco, Cal.

Canadian National Carbon Co., Limited, Toronto, Ontario

Emergency Service Plants

PITTSBURGH, PA.:

7th Floor, Arrott Power Bldg. No. 3, Barker Place

Phone: ATLantic 3570

CHICAGO, ILL.: 551 West Monroe St.
Phone: STAtc 6092

NEW YORK, N. Y.: 237 East 41st St.
Phone: VANDerbilt 0425

Westinghouse Field Coil

A Reliable Field Coil

For Your Westinghouse Motors

All Westinghouse Field Coils are impregnated by the vacuum high-pressure process. They are moisture proof and heat resisting. The leads are reinforced against breakage and the insulation is specially protected at all bends and cross-overs.

Extra insulation applied to top and bottom turns, inside.

Extra insulation at all cross-overs.

Fish paper protection strips at top and bottom.

Style number of coil.

Heavy cotton tape overlapped.

Fish paper protecting strips are inserted between layers at corners.

Coil impregnated with gum.

Leads firmly tied to side of coil.

Three layers of treated cloth tape overlapped.

Adequate stocks of field coils are carried in our various district warehouses for your convenience.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries



Westinghouse

MORRIS RUCK
Managing Editor
JOHN A. MILLER, Jr.
Associate Editor
C. W. SQUIER
Associate Editor
G. J. MACMURRAY
News Editor

ELECTRIC RAILWAY JOURNAL

HARRY L. BROWN, Editor

HENRY W. BLAKE
Senior Editor
CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
MERRILL A. KNOX
Editorial Assistant
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

CONTENTS

JANUARY 31, 1925

Editorials	171
Modern Painting Methods Used in the Everett Shops, Boston—IV	173
Many types of modern motor-driven equipment used for paint preparation include paint, enamel and putty mixers, pebble grinders and lead cutters. Very complete facilities for paint storage. Records of paint tests kept. Procedure followed in painting of cars, signs and various fittings is described.	
Sub-Surface Terminal for Los Angeles	179
Plans for the Hollywood-Glendale-San Fernando Valley subway now under construction have been altered to include an underground terminal station in a new \$4,000,000 building for the Pacific Electric Railway. Provision will be made for other subways planned for the near future.	
Service Readjustments Would Increase Atlanta Earnings \$700,000	181
Beeler report states that elimination of jitneys and rerouting of street cars of Georgia Railway & Power Company would increase railway revenue and reduce operating expenses. Relocation of car stops would speed up service. Co-ordinated railway and bus operation is recommended.	
Not a Picture of the Eclipse	185
Campaign to Reduce Accidents	185
Track Machinery Combined into a Single Unit	186
I. T. S. Builds Articulated Locomotives	187
Eighty-eight ton freight units are designed to operate around short radius curves. By using eight axles, wheel loads are kept low. Passenger car motors used with external blowers.	
Track Reconstruction Speeded Up by Using Mechanical Ties	190
By T. E. HOWELL	
Increasing Speed of Car Loading at Terminals	191
By H. S. WILLIAMS	
Upper Deck Inclosed for Winter	192
Association News and Discussion	193
American Association News	193
Maintenance of Equipment	194
News of the Industry	197
Financial and Corporate	201
Personal Mention	205
Manufactures and the Markets	207

McGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York

JAMES H. MCGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MUIR, Vice-President
E. J. MUEHLEN, Vice-President
MASON BRITTON, Vice-President
JAMES H. MCGRAW, Jr., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary

WASHINGTON:
Colorado Building
CHICAGO:
Old Colony Building
PHILADELPHIA:
Real Estate Trust Building
CLEVELAND:
Leader-News Building
ST. LOUIS:
Star Building
SAN FRANCISCO:
333 Mission Street
LONDON:
8 Boulevard Street, London, E. C. 4
Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations



Cable Address: "Machinist, N. Y."
Publishers of
Engineering News-Record
American Machinist
Power
Chemical and Metallurgical Engineering
Coal Age
Engineering and Mining Journal-Press
Ingeniero Internacional
Bus Transportation
Electric Railway Journal
Electrical World
Electrical Merchandising
Radio Retelling
Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
American Machinist—European Edition
(Published in London)

The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries \$3 (total \$7 or \$8 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 25 cents.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place. Copyright, 1925, by McGraw-Hill Company, Inc.
Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office at New York, under the Act of March 3, 1879. Printed in U.S.A.

More than a Coincidence

ONCE upon a time, long ago, a young street car conductor had a voracious appetite for knowledge about his business. When the superintendent was out of his office this ambitious youth used to slip in and borrow his copy of the STREET RAILWAY JOURNAL. When the superintendent stuck close to his desk, the reading of the paper had to be postponed. But the young man always managed to read one week's copy before the next one arrived.

Later, the conductor became an inspector and subscribed to the JOURNAL. Then he had the paper sent to his home and read it at night after the day's work was done. Next, he took up the duties of dispatcher and read the magazine during the slack time. Now, however, he has become superintendent himself and reads the ELECTRIC RAILWAY JOURNAL while seated at the same desk from which he formerly borrowed the paper.

Probably it would be too much to claim that reading the JOURNAL regularly was responsible for this conductor becoming superintendent of the railway. It is remarkable, however, that one often finds an executive who has thus been a reader of the JOURNAL for 25 years or more.

Meeting Competition

The competition of public and privately operated automobiles can be met only by engineering development which will increase the safety, comfort and convenience of passengers. But all you may do will come to naught if your track-work racks the rolling stock and "riles" your passengers. Corrugated rail, cupped joints and battered special work make rough, noisy riding and soon ruin the track foundation. "Ajax" arc welding and everlasting track-grinding, by saving the rail, save all.

Booklet?
Quotation?
Both?

Railway Track-work Co.

3132-48 East Thompson Street, Philadelphia

AGENTS:

Chester F. Gailor, 30 Church St., New York
 Chas. N. Wood Co., Boston
 Electrical Engineering & Mfg. Co., Pittsburgh
 Atlas Railway Supply Co., Chicago
 Equipment & Engineering Co., London



"Reelprocatting" Track Grinder



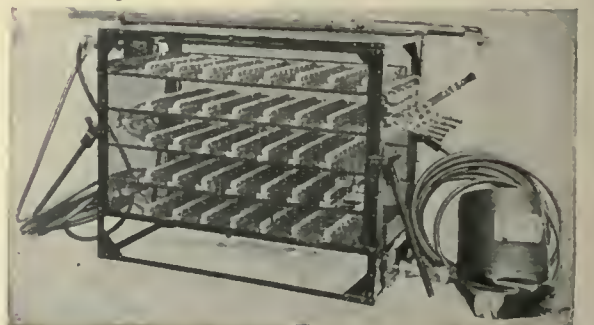
"Vulcan" Rail Joint Grinder



"Atlas" Rail Grinder



"Hercules" Swing Frame Rail Grinder



"Ajax" Electric Arc Welder



Foundry slag
skimmed from
molten bronze

Keeping the Bronze Clean

The great care exercised in mixing the virgin metals and in controlling the furnaces to keep O-B Bronze at its high standard, is not offset by oversights in pouring.

The magnified views of bronze castings shown in the circles illustrate what happens if the closest watch is not kept over the pouring process. The enlargements show flaws—which mean weak points in the casting—caused by unskimmed slag being allowed to get into the mold.

You do not find slag flaws—fracture points—in O-B Bronze. A trained foundryman watches the pouring of every pot of metal. He makes sure that the slag is skimmed. That means uniform, pure bronze for you.

The Ohio Brass Co.
Mansfield, Ohio

B
PRODUCTS

WABCO Gaskets

are made in the

"HOME OF THE AIR BRAKE"

The Gaskets which are now being furnished by the Westinghouse Traction Brake Company are made in our own plant.

They are the result, first, of long experience which has taught us what qualities a gasket should have, and, second, the manufacturing methods evolved by careful research and experiment.

These gaskets are made of the familiar WABCO material with beads perfected in design and location, to insure the tightest and most enduring seal at vital points in air-brake apparatus.

Each particular type of gasket is made suitable for its specific purpose by varying the material and its treatment to obtain the right degree of hardness, resiliency, and durability. This is possible because the process is exclusively our own and can be controlled at will.

By using WABCO Gaskets exclusively, you are assured of uniform lasting qualities in any particular type of gasket and that this type will be exactly suited to its purpose.

✕ WABCO ✕



Westinghouse Traction Brake Co.
General Offices and Works
Wilmerding, Pa.



All Permanent Materials Make Paved Track Renewable

The combination of the simple and permanent materials, *steel and concrete* with the ordinary methods of track and paving construction developed by fifteen years' experience of our users make Twin Tie Track renewable.

In its essentials the renewal feature of Steel Twin Tie Construction depends on the fact

that there is nothing in such construction to absorb water to start cracks nor to rot and undermine rail and joints.

When you hear that such construction is lower in first cost than wood tie construction the rumor deserves intensive investigation.

Write for all the data when you are ready to plan your Paved Work.

THE INTERNATIONAL STEEL TIE CO., Cleveland, Ohio

Steel Twin Tie Track

Renewable Track . . . Permanent Foundation



69th Street Terminal, Philadelphia, Pa.

Wharton Trackwork

An illustration of the ability of Wm. Wharton Jr. & Co., Inc., to furnish the proper trackwork for any given condition. The lay-out embraces frogs of our short, solid manganese steel construction, type SMT. The switches carry manganese steel tips.

Our experience in trackwork is the experience of the electric railways themselves. It dates back to the beginning of the industry.

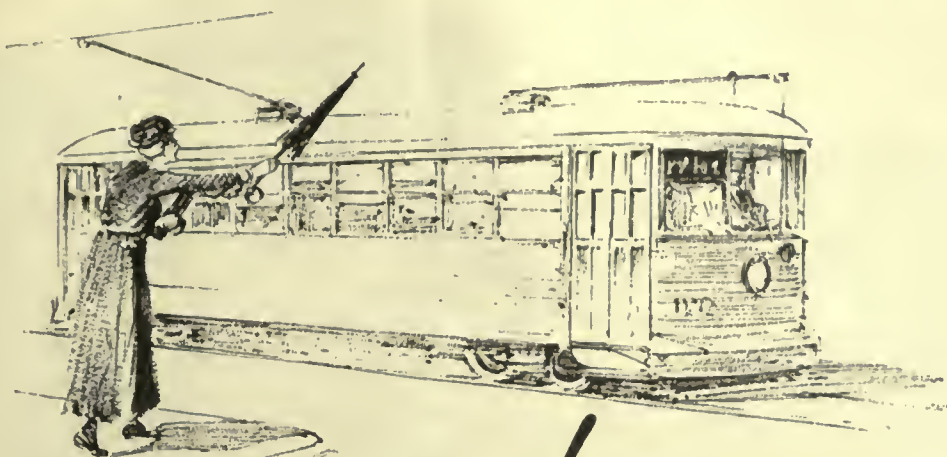
Trackwork of TISCO manganese steel is known practically all over the world, and we have developed our manufacturing facilities so as to meet every demand.

Wm. Wharton Jr. & Co., Inc.
Easton, Pa.

TAYLOR-WHARTON IRON & STEEL CO.

Wm. Wharton Jr. & Co., Inc.

Tioga Steel & Iron Co.
Philadelphia Roll & Mach. Co.



She missed it!—

Because the 20-year old sign had not been given proper attention.

AND then she probably walked or took a taxi. Just another fare lost for the Company—another possible friend antagonized.

Car Signs can't last forever! The best will wear out, get dirty, or become obsolete as routes and conditions of operation change. Why not keep your best advertising assets in order?

Hunter-Keystone Signs are most practical from this point of view. New black roller curtains are inexpensive to purchase and easy to install. For a trifling outlay an entire rerouting and destination scheme can be arranged for Hunter-Keystone Signs. Fresh curtains with sharp contrasting lettering—will attract immediate and favorable attention.

ELECTRIC SERVICE SUPPLIES Co.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
829 Oliver Building

NEW YORK
50 Church St.

SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.
BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver





Grade 4 and grade 5 ties produced for a large Railroad on a service contract for its 1924 tie requirements.

There Is No Saving Like Intelligent Buying

International does not promise quality; by the thoroughness of its methods it assures it. That's sound business—for mere claims of quality cannot weigh against Proof of Quality—and *International* does present Proof that cannot be denied.

Every *International* Tie is permanently marked with our monogrammed dating nail as assurance to you that the timber is sound, the grade accurate, the seasoning thorough and the treatment correct.

International stands squarely behind every *International* Tie. It does not relinquish its interest in its ties after delivery—on the contrary it wants the name *International* Ties in your yards, on your right of way and in your track.

• The name *International* lives with the ties. It is your security.

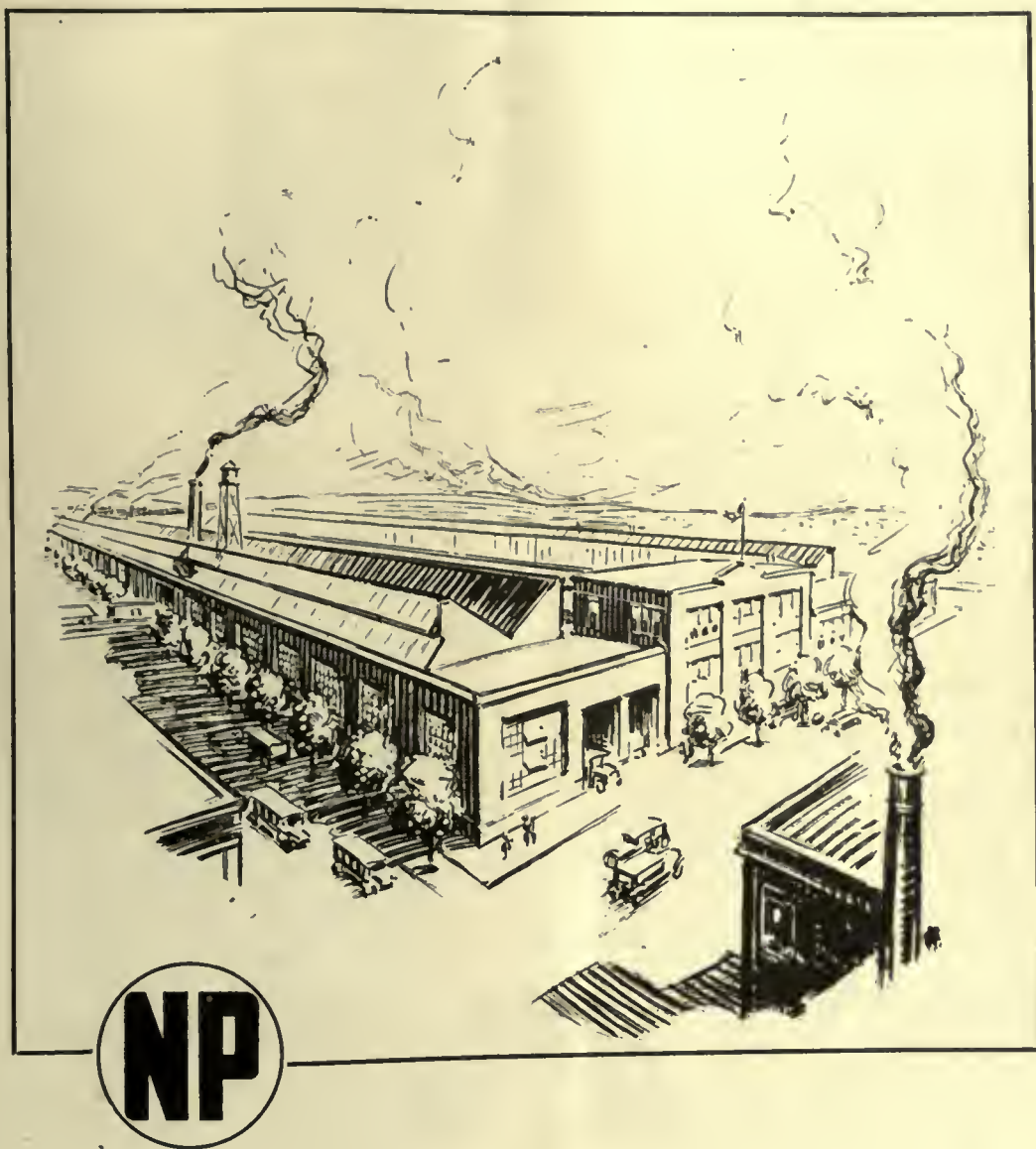
International Creosoting & Construction Co.

General Offices—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas

International

Standard Specification Ties



At Rahway, New Jersey, this modern and efficient plant was built to produce the best door and step operating equipment that can be designed. It is, in fact, the *only* plant exclusively devoted to the study, design and manufacture of door and step mechanisms.

NATIONAL PNEUMATIC COMPANY

Executive Office, 50 Church Street, New York

General Works, Rahway, New Jersey

CHICAGO
McCormick Building

MANUFACTURER IN
TORONTO, CANADA
Dominion Wheel & Foundries, Ltd.

PHILADELPHIA
Colonial Trust Building

THE OKONITE COMPANY
and
THE OKONITE-CALLENDER CABLE COMPANY, Inc.

WISH to announce that on
and after

FEBRUARY 1st, 1925

they will establish their own
sales offices and warehouse in
Chicago and offices at St. Louis.
Chicago address—310 South
Michigan Boulevard, corner
Jackson Boulevard.



THE OKONITE COMPANY
INCORPORATED 1884
THE OKONITE-CALLENDER CABLE COMPANY, Inc.
PASSAIC, NEW JERSEY

Sales Offices: New York - Chicago - Pittsburgh - St. Louis
Atlanta - Birmingham - San Francisco

F. D. Lawrence Electric Co., Cincinnati, O.

Novelty Electric Co., Philadelphia, Pa.

Pettingell-Andrews Co., Boston, Mass.

Canadian Representatives: Engineering Materials Limited, Montreal



Headroom required
Only 14 feet!

Have you considered double-deck buses?



Low step, comfortable seats, adequate illumination, easy-riding, quiet operation, the open air ride in mild weather, the upper-deck protected in inclement weather—these are but a few of the big points of unquestioned superiority of Fifth Avenue Type L Double-Deckers.

WHY not a Fifth Avenue Transportation System for your community? Fifth Avenue Double-deck buses have proved themselves an attractive revenue-building type of equipment, admirably suited to the transportation of half a dozen typical American cities.

TYPE-L

55 passenger seats

* * * * *

**All-weather top for
the upper deck**

* * * * *

Short wheelbase 14 ft., 6 $\frac{3}{4}$ -in.

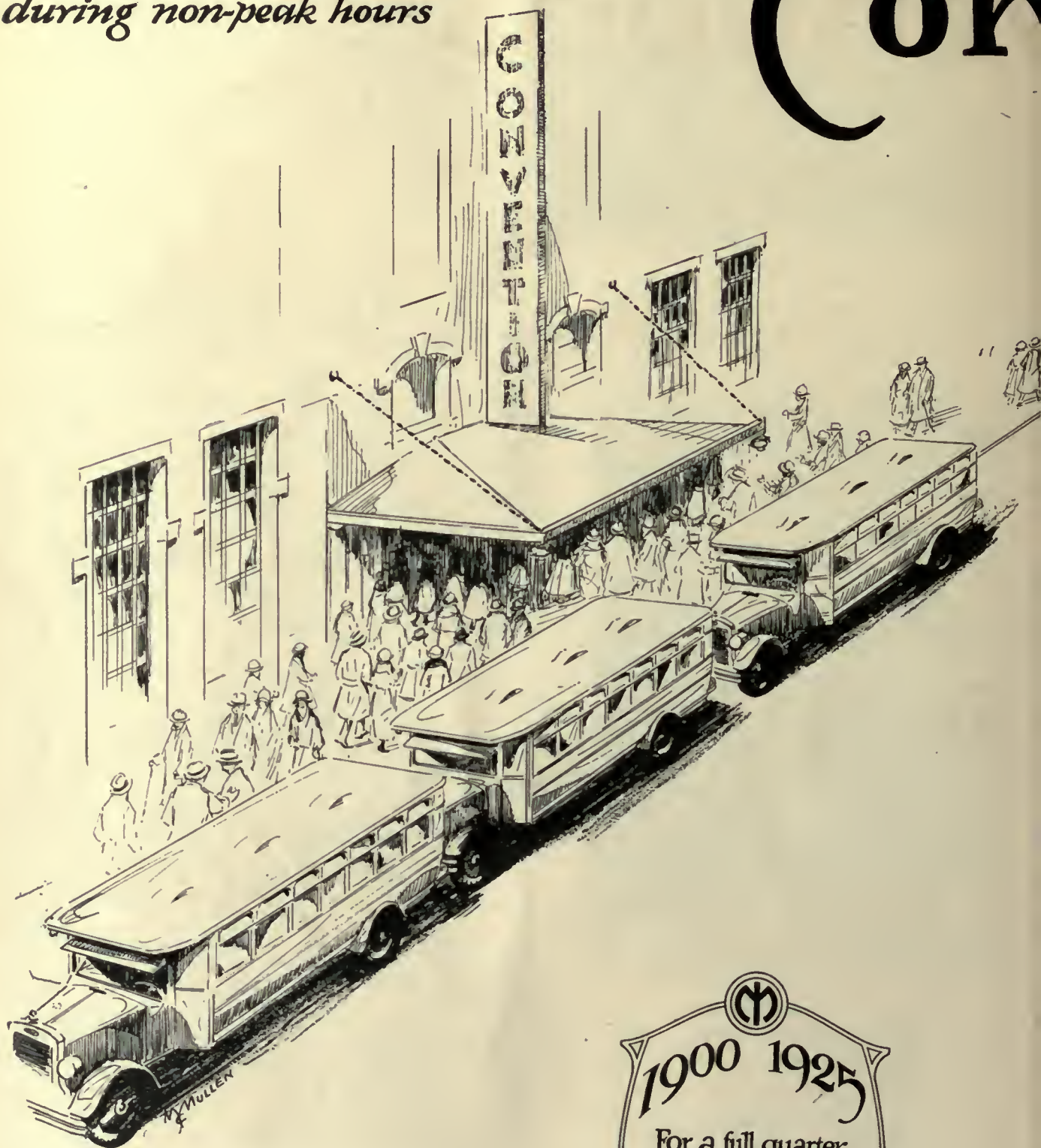
Double-deckers unquestionably are the answer to traffic problems in congested city streets. Fifth Avenue Type L Buses occupy only 3.4 square feet per seated passenger. With such a short-wheel base, and a short-turning radius, they are the most practical units available for handling passenger transportation in heavy traffic.




FIFTH AVENUE BUSES

*No. 1 of a series showing
the utility of Mack Buses
during non-peak hours*

Con




1900 1925
For a full quarter
century Mack interests
have been centered
on the
manufacture of
transport vehicles

ventions!

Granted that public transportation is a logical monopoly, why should not the electric railways take full advantage of bus flexibility?

During conventions, for instance, transportation of delegates almost invariably involves the chartering of one or more buses. This business might profitably be handled by the electric railway company during non-peak traffic hours.

The good-looking comfortable Mack Bus exactly fits the needs of such special charter business. Every detail of Mack design has been worked out with a keen eye both to passenger comfort and sound practical utility.

The Mack Bus is all bus — planned and built under one supervision in the Mack

Plants. Mack mechanical features bear the stamp of units specifically designed for bus service. The Mack Shock Insulator Suspension with all spring ends imbedded in cushions of live resilient rubber affords a new degree of riding comfort.

The improved Mack Engine assures utmost reliability.

The chassis has long low lines and wide tread.

The Mack dual reduction rear axle is strictly a bus axle designed to give maximum road and under body clearance.

So it goes right through the Mack specifications. Mack Bus engineers will gladly discuss the many other features that have helped make Macks famous.

The Mack Bus

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 BROADWAY NEW YORK CITY

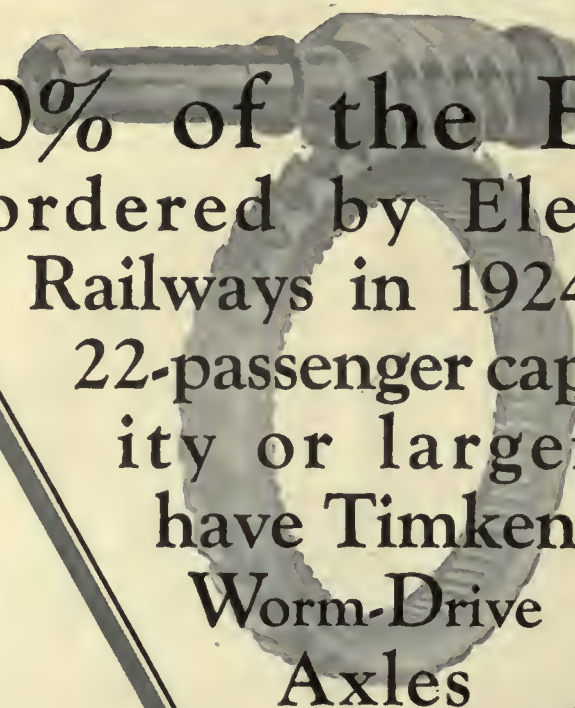
Eighty-five direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."



Sedan Type Bus

Performance counts!

TIMKEN



70% of the Buses
ordered by Electric
Railways in 1924, of
22-passenger capac-
ity or larger,
have Timken
Worm-Drive
Axles

The Timken-Detroit
Axle Company
Detroit, Michigan



AXLES



This equipment of the Chicago, North Shore and Milwaukee Railroad is lubricated by Galena Lubricants.

Is Galena Quality Necessary?

GALENA Lubricants have as a base the finest crude oils obtainable—unique distinction.

But for electric railway use, is this high quality essential?

Would some cheaper oil perform well enough?

Galena knows it would not.

So much that Galena refuses to resort

to lower grades even to meet price competition.

How easy it would be for Galena to make a cheaper lubricant, but it won't. It can't afford to.

Over half a century of making and serving railroad lubricants to a set standard has convinced Galena that anything less than present Galena quality is a risk too costly to take.



Galena-Signal Oil Company

New York

Franklin, Pa.

Chicago

and offices in principal cities



You no longer throw away
the whole controller finger



The accepted principle of renewing
only the tip of a controller finger
is now applied to G-E Brush-
holders



Don't purchase supplies at random.
Use your G-E Catalog

Why Continue to scrap the whole brush-holder?

That's a fair question. When only the carbon-way is worn, why put on a complete new brush-holder, now that you can replace the worn part for about one-fifth the cost?

Use G-E Renewable Carbon-Way Brush-holders and reduce this item of maintenance.

New G-E Motors are furnished, of course, with these improved holders. But many companies have equipped their old motors likewise, because they want fewer motor failures, lower maintenance, and better service.



General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities



GENERAL ELECTRIC

New York, January 31, 1925

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HARRY L. BROWN, Editor

Volume 65
Number 5

Getting First-Hand Information

Concerning Quality of Service

ADVERSE criticism of electric railway service is occasioned much more frequently by small things than by really serious shortcomings. Cold cars, windows that cannot be opened or closed easily, buzzers that don't buzz, dirty platforms and stations, abrupt starting and stopping, and annoying little delays at carhouses or fare limits, cause about nine-tenths of the complaints. To the passenger the arrangement of seats is of much greater importance than the type of motor used underneath the car.

In this motorized age, the general manager of nearly every electric railway has his own automobile to take him from place to place, and the use he makes of his own railway is comparatively infrequent. It is the more difficult for him on this account to know exactly what his customers are thinking. An example showing how far a railway official who does not ride his cars may misjudge public opinion is furnished by an operating man, who some time ago sought to "improve the service" by taking out all cross-seats from his cars and putting in longitudinal seats. Whatever gain might have been made in carrying capacity was more than outweighed by the resulting general dissatisfaction among the riders.

On the other hand, some managers make a practice of riding the cars regularly just to get the point of view of the passengers. That is well worth doing. The layman does not and never will understand nor be interested in the major problems of running a railway. These he rightly leaves to the management for solution. But he is interested in the small things that affect his comfort. If these are well taken care of he has a good opinion of the company, but if they are neglected he is antagonistic. It behooves the railway therefore to pay particular attention to such details, however unimportant they may appear.

Tardy but

Not Too Late

DOWN East there is a small electric railway struggling for existence. It shall remain nameless, for it is not the property but the circumstances surrounding it that count. Fares had been kicked up and up and up without result in giving more revenue. A charge of \$1 per passenger would have done no good. The railway had cut off lines. It had trimmed sail in what it thought was the orthodox fashion. Each time it did so a bus turned up to afford the service which the railway had decided it could no longer give profitably. Not only that, but the buses were not content merely to cover the route discontinued by the trolley. The operators ran into the business districts.

Unlike some other cases, the management has seen the error of its ways. It has begun to study the methods of its competitors, and it is now preparing to

modernize and merchandise. In a short time its cars, repainted and refurnished, will glide down the main street through the maze of limousines, vying with them in the degree of comfort afforded rather than being in strange contrast to them in that respect. Moreover, residents who have been accustomed to jump at the shrill blast of an air whistle will take warning hereafter from a siren carefully toned down. It is a small thing, but whistles don't differentiate between patrons and those they are intended to startle. The management knows this now. Another thing, resort is to be made to the use of the bus where it will be of value, particularly because the railway management has become convinced of the versatility of that vehicle. In this case, as in so many others, the bus operators were not more formidable; they were just a trifle more resourceful. They are to be met now on their own terms, with the prospects all in favor of the electric railway with its co-ordinated operation.

Sectional Associations

Cultivate Broader Thinking

ONE of the most important functions that may be performed by sectional associations is that of helping to bring men up for the job ahead. This was one of the principal objects in the formation of the Mid-West Electric Railway Association, as expressed at a recent meeting of that association by F. G. Buffe, general manager Kansas City Railways. It was pointed out that the association hoped to encourage department heads and their assistants to take part in the discussion of some of the broader problems of the industry.

Undoubtedly, the programs and procedure for such meetings should be planned with this object in view. Such plans should receive the wholehearted support of the managements of member companies to the extent not only of encouraging department heads to take part in the discussion of subjects of general interest, but of urging them to do so. The average department head is far too prone not to be interested in subjects outside of his department specialty. This applies particularly to technical men as a class. They tend to overlook the broader aspects of their industry and to become so absorbed in the specialized work of their respective departments as to lose sight of the problems of transportation as a business.

Association work offers an opportunity for broadening the viewpoint of men down the line. At sectional association meetings, time for full and free discussion can be made available. Thus in addition to its function of taking up questions of local interest to the member companies, the sectional association may perform the very useful purpose of helping to bring men up for the job ahead.

Neglected Publicity Opportunities in the Smaller Cities

EVERY town large enough to have an electric railway has at least one hotel. Somewhere in the lobby of this hotel will be found a time-table rack displaying advertising folders of various railroads, steamship lines, hotels in other towns, intercity bus lines, and the like. But it is seldom that one sees any electric railway publicity matter in such a place. Unfortunately, this is usually not because these folders are so much in demand that the supply has been exhausted, but rather because the railway management does not take the trouble to furnish them.

This important field of publicity endeavor has been neglected by a majority of the railways in the moderate size towns. There are, of course, a number of companies which have done good work along these lines, but they are the exceptions. Many of these exceptions merely supply time-tables, missing the opportunity for something more attractive and having more selling appeal. This is a field well worth cultivating.

A large number of the hotel guests are potential patrons of the electric railway. In summertime some of them may be transient automobilists, but for the most part they are strangers with no private means of transportation. To get around the town, or to leave the town, they must either walk, take a taxi, ride a bus, the trolley or steam railroad. When no effort is made to familiarize them with the railway service, it is hardly surprising that many choose the steam railroad, taxi or bus.

The average man likes to plan his movements ahead of time, and wants to have information available which will permit him to do so. Moreover, he is naturally disinclined to ask questions. If he can pick up a folder giving the routes and schedules of the electric railway and study them during his spare time, he is much more likely to use the railway than if considerable effort is needed to find out where and when cars run.

Designing Cars to Please the Public

THE demand for changes and innovations in transportation is being repeatedly emphasized in the discussions of railway men generally. One subject where this is particularly noticeable is in the design of electric railway cars, which was the subject of several papers before the New York Electric Railway Association last week. Though modern electric railway cars are a decided improvement over most of the cars built 25 years ago, they are not radically different in their general appearance. The bus, on the contrary, gives the public an impression of being a new type of vehicle, designed along new lines, and capable of being operated in a new way. Hence it has a special appeal to a certain element of the public as something novel and radically different from that to which the riders have been accustomed. Inherently, any difficulties that may be attached to the task of improving the appearance of transportation vehicles are greater in the case of the bus than in the railway car. Consequently, there seems to be no good reason why marked improvements in the appearance of cars cannot be made so that an important passenger-attracting factor will be added. Why not, then, design with an eye toward that distinctive appearance and element of novelty that creates a natural desire to ride on the new vehicle—and perhaps couple that design with a new kind of service?

Some progress in this direction has been made in some of the cars described before the meeting. The Illinois Traction car, for instance, was worked out with the particular thought of pleasing the traveling public. More comfortable seats, better heating and ventilation, better toilet facilities, easier ingress and egress and a pleasing appearance, both inside and out, have all contributed to the success of the new cars. Their light weight and low operating cost have also made it possible to couple the novelty of the design with a new type of service, in which better headways are given and high speeds are maintained.

The result was easy to foresee—receipts have increased, according to Mr. Bosenbury, who prepared the paper. This is the most substantial way in which the public finally voices its approval of the new car and the improved conditions that it has brought about.

Give Chicago Voters a Fair Choice

INCREASED attention is being attracted to Chicago as the discussion of its local transportation situation progresses. With the time of expiration of the existing surface lines' franchises now only two years off, an attempt is being made to work out a comprehensive plan that the voters will accept, which will provide a unified transportation system, and which will permit extensions and improvements to be made as needed.

Two major plans have been made public. One originated with the Mayor and his advisers; the second with Henry A. Blair, president of the Chicago Surface Lines. A third proposal by Samuel Insull offers immediate extension and improvement of the elevated lines, but does not make any provision for inclusion of the surface lines as a part of a comprehensive system.

All of the physical plans include the construction of subways in the congested business district. A general similarity appears as to the remainder of the two major physical plans. There is, however, one important difference between the views of the Mayor and Mr. Blair. The Mayor maintains that it will be impossible to grant a franchise for a long enough period to enable extensions and improvements to be privately financed. He has endeavored to work out an arrangement under which the city can purchase its transportation facilities by the issuance of so-called Swartz certificates—a lien on the income of the properties. Mr. Blair, on the other hand, maintains that private ownership will insure freedom from political management and that a franchise permitting a comprehensive plan to be financed would be approved by the voters provided that the subject were fairly presented.

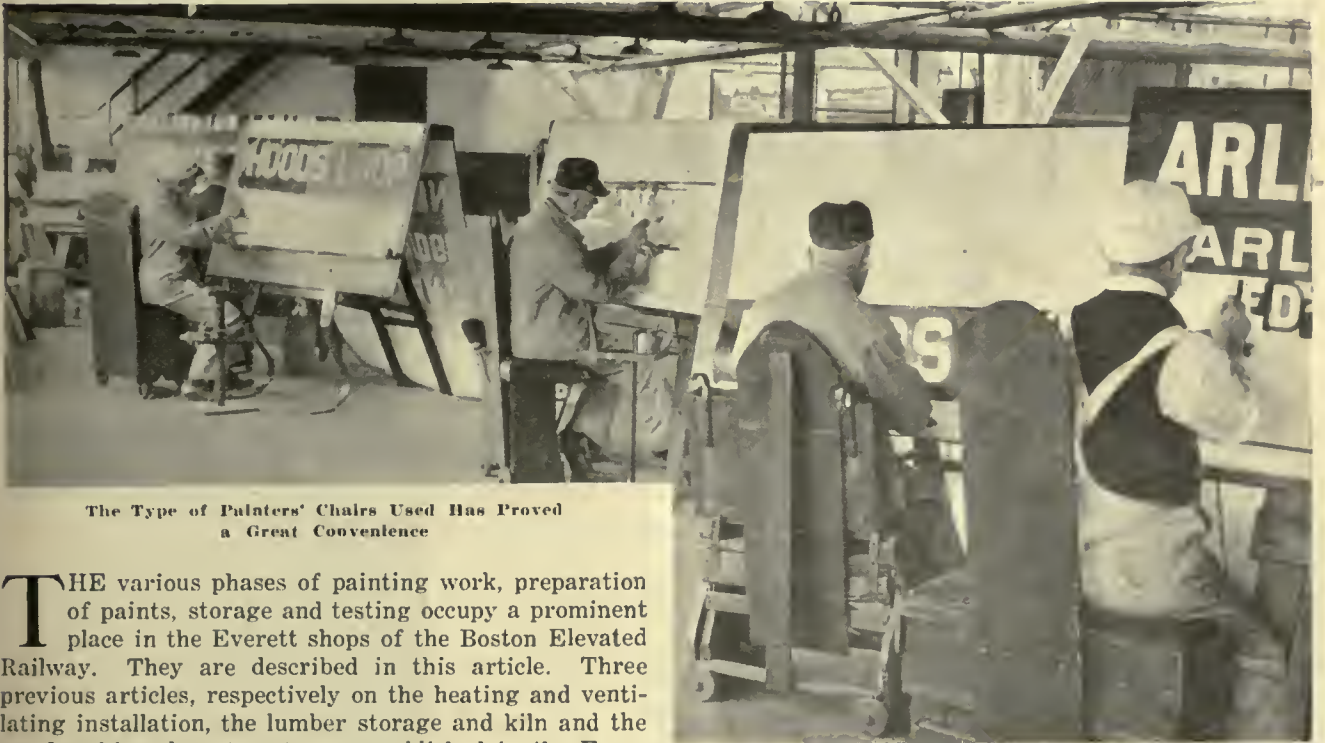
So far, the Mayor has shown no inclination to put the subject squarely before the voters. A referendum will be held, as it is necessary under the law. But the Mayor's program, as disclosed so far, contemplates putting the city purchase plan alone on the ballot.

It is generally considered that Chicago's Mayor is sincere in his views of the local transportation problem. In that the city is more fortunate than under the former administration. But a sincere effort to secure the best transportation plan would mean at the least putting both the Mayor's and Mr. Blair's proposals on the ballot. Instead of this the Mayor would ask the people to say "yes" or "no" to one plan only. Acceptance means municipal ownership; refusal is generally considered to mean a receivership or long delay in improvements.

Modern Painting Methods Used in the Everett Shops, Boston

Fourth Article

Many Types of Modern Motor-Driven Equipment Used for Paint Preparation Include Paint, Enamel and Putty Mixers, Pebble Grinders and Lead Cutters—Very Complete Facilities for Paint Storage—Records of Paint Tests Kept—Procedure Followed in Painting of Cars, Signs and Various Fittings Is Described



The Type of Painters' Chairs Used Has Proved a Great Convenience

THE various phases of painting work, preparation of paints, storage and testing occupy a prominent place in the Everett shops of the Boston Elevated Railway. They are described in this article. Three previous articles, respectively on the heating and ventilating installation, the lumber storage and kiln and the woodworking department, were published in the *ELECTRIC RAILWAY JOURNAL* for Nov. 22, Dec. 13 and Dec. 27.

The paint shop is of the same general design from the building standpoint as the wood mill. It has 22 tracks available for car painting, with space for handling 52 surface cars of the largest type operated on the system. The floor is of reinforced concrete, finished with a surface treatment to keep down dust. Between the rails are drains in the floor to take care of the drippings from the cars. The floor, however, is practically level, to facilitate the operation of traveling painting stagings. The small amount of water coming in is taken care of by sweeping it into the drains.

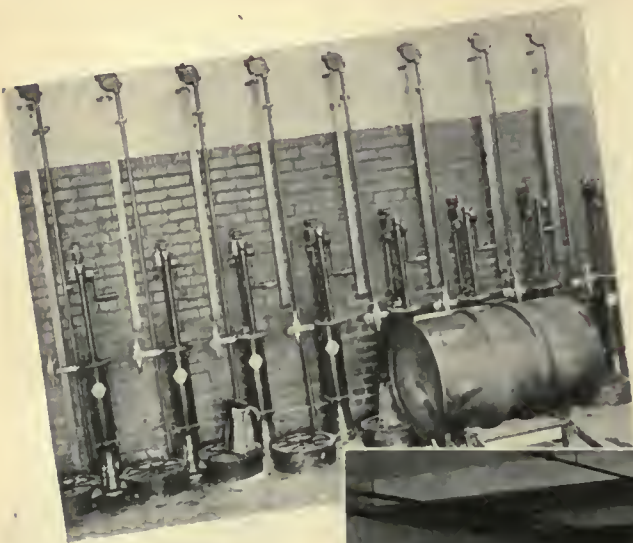
Special provision has been made in this building, as in the others of the Everett group, for adequate toilet facilities. Urinals in the centers of the painting spaces are concealed with small screens. Thus the men do not have to walk any great distance. Excellent lavatory facilities are also furnished.

A thoroughly modern paint mixing and stock room is located on the ground floor, with a complete and well arranged layout of slate shelving for storage and motor-driven machinery for mixing paint and making putty. Adjoining the paint storage is a glass department, where glass is stored in cases, according to size, and so distributed as to be available at all times. The south end of the paint shop floor is assigned to the

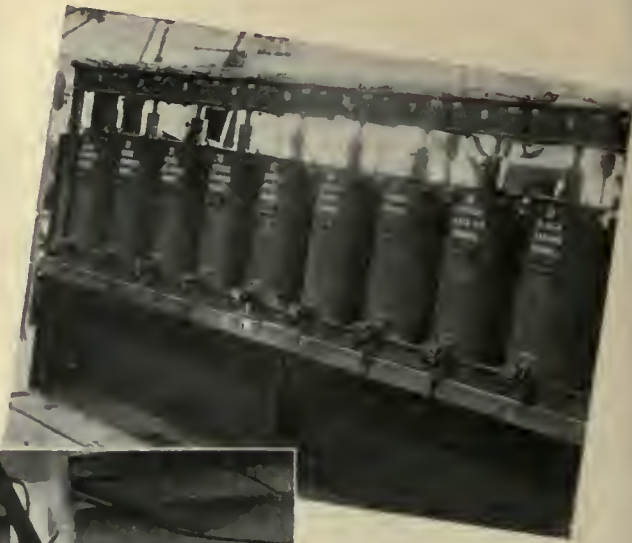
painting of trucks and buses. Beneath the paint stock room is a basement containing supply tanks from which turpentine, oil, varnish, etc., are pumped for delivery inside the storage room.

A balcony extending over the paint and glass storage rooms is connected with the ground floor by an electric elevator. This balcony is devoted to sign painting, locker rooms, shower baths and the office of the superintendent of the Everett shops. In this building the height from the top of the rails to the under side of the roof trusses is 20 ft. and the bays are 32x44 ft. The skylights were designed with the lower half stationary and the upper half movable. It was found that sufficient ventilation could be had in this way, with the operating mechanism kept at a minimum. As in the wood mill, the operating sash are moved by motor-driven equipment controlled by push-buttons from the first floor. About 150 ft. of sash can be handled satisfactorily in a run from a single motor.

The paint stock room, about 63 ft. long by 39 ft. wide, combines preparation and storage functions and is exceptionally well equipped with power-driven machinery. Three fire doors in the wall separate this section from the paint shop interior proper, another fire door on the north side leads into a stock room for dry colors and a fifth fire door opening into a driveway on the east



Battery of Self-Measuring Pumps Which Are Connected with the Basement Tanks. In the Foreground Is a Drum in Position for Emptying Into One of the Tanks



Battery of Enamel Agitators Driven by Motor Mounted on the Ceiling. These Are Used for Mixing Ten Different Enamels



Three Heavy-Duty Paint Mixers

Paint Storage
and Mixing Equipment
in the
Everett Shops, Boston

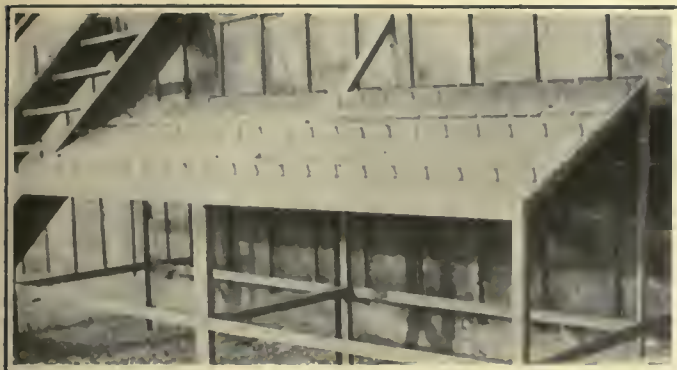
Pigment Mixer



Portable Paint Mixer—An 80-Gallon Tank, One of Twelve Units in the Everett Shops, Is Shown on the Track



Pebble Mills and Shellac Cutters. A Row of Paint Grinders Is Shown in the Background



At Left, Test Rack for Paints. After Attaching Panels to Rack, They Are Exposed to the Weather.
At Right, Method of Feeding Heading Through Staining Tank

side of the building is used by motor trucks in delivering supplies to the paint storage section. The handling of materials has been simplified by this door arrangement. Barrels of turpentine, linseed oil, driers and varnish are rolled off the trucks by hand and skidded into the stock room. These are then rolled over to the west side of the room, tilted upon cradles equipped with sieves and discharged into basement storage tanks through floor funnels terminating in short pipes feeding the tanks below. Racks for the storage of containers are also provided in the stock room and in the basement, these raising the containers above the floor about 12 in. to facilitate tapping.

On the west side of the stock room is a battery of 11 hand-operated self-measuring Milwaukee pumps connected with the basement tanks and discharging into receptacles as required in the stock room. Nine of these tanks are in the basement, but to give fire protection a 500-gal. tank for the storage of gasoline and another of the same size for the storage of alcohol are placed underground below the driveway. These are filled from tank trucks by outside hose connections, and the liquids are drawn through pipe connections leading through the stock room basement to the tank outlets.

Containers for soluble oil, orange shellac, white shellac, paint remover, "cotelac" and electric car oil are racked on the east side of the stock room. These materials are used in color mixing and thinning and for lubrication.

In this shop the method of mixing or agitating has been carefully worked out. Most of the machinery in the stock room was designed and built by the J. H. Day Company, Cincinnati, Ohio. Economy of labor was kept in mind at every stage. Centrally located is a group of three agitators served by removable contain-

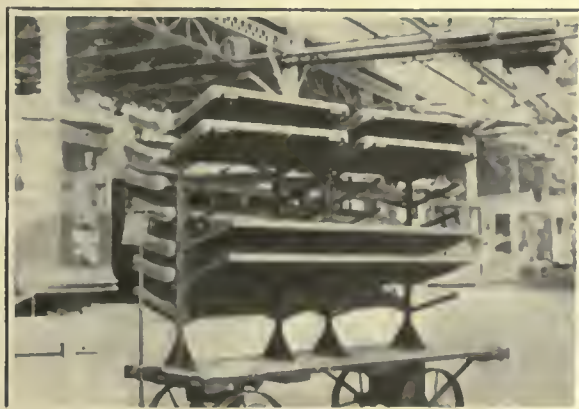
ers holding 80 gal. each. These containers are kept in the stock room on the east side just beyond the color mixing and thinning section and hold bronze-green truck paint, zinc-white floor paint, lead-colored roof paint and bunter white. The battery of agitators is driven by a 5-hp. motor mounted on the ceiling. Each agitator is belted to a central overhead pulley chain-driven from the motor pulley. Idler pulleys for each agitator enable any unit to be cut out of service independently. The containers used with these agitators are mounted on wheels to facilitate rapid placing and removal. The mixers are so arranged that the operator can grind his color material into the requisite can, roll the container to the mixer and either thin down or tint for use as necessary.

Beyond the east door of the paint stock room are located a white-lead cutter, a 350-lb. putty mixer and a steam-jacketed kettle for breaking down and recovering paint skins from pots, etc. The lead cutter, a 50-gal. "Hero" mill, is used in breaking down and mixing heavy pastes preparatory to their grinding and thinning. This machine is driven by a 5-hp. motor with starting switch on the mill frame. Next is a 350-lb., 48-in. putty chaser, group-driven with a 50-gal. kettle from a 3-hp. motor mounted overhead. At the north end of the room are a 20-gal. pebble mill, an 80-gal. orange shellac cutter and a similar one for white shellac, group-driven by a 5-hp. motor which also drives three water-cooled mills in group. Any one of these six machines can be cut out of service by a clutch without interfering with the others.

The pebble grinder is a No. 7 Abbe mill with Silex lining. It is specially designed to keep the material out of contact with the outside air and is particularly valuable where the thinner is volatile and must be



Hopper Truck for Receiving
Paint Samples



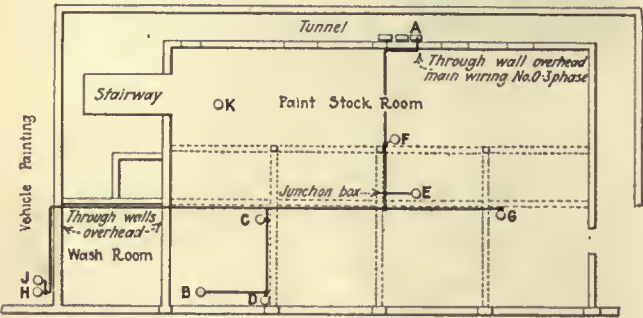
Hand Truck with Backing to Hold Seats and
Backs for an Entire Car



Brushes Are Held by Spring
Clips in a Water Tank

confined absolutely during the grinding process. The three 15-in. diameter color mills are arranged in gang to enable one mill to be used for a particular color, thus saving cleaning and the possibility of discoloration which sometimes results where a mill is employed for several colors. The stones are dressed for color grinding and the mills are used extensively in the preparation of delicate coach colors.

Three 200-gal. Paragon mixers group-driven by a 5-hp. motor in the center of the stock room are used in thinning down and tinting paint produced in quanti-



Wiring Layout for Motors and Ovens Used in Paint Stock Room, Everett Shops

ties and are each provided with a clutch for separate operation.

Between the pebble mill and the pump and serving shelf section of the paint stock room is a battery of 10 10-gal. enamel mixers group-driven by a 5-hp. motor. Each has an independent clutch. These mixers are assigned to the following enamels, keeping each intact for one kind of material—outside car green, inside light green, inside dark green, outside pullman, inside white, outside white, cherry, outside black, black baking and orange. A portable “Revolvator” driven by a 4½-hp. motor is in service in the paint shop.

The tank installation in the paint stock room basement consists of seven 50-gal. tanks assigned to compressor oil, machine oil, compensator oil, kerosene, lard oil, lacquer and lacquer thinner, two 300-gal. tanks for japan and driers, five 500-gal. tanks for finish varnish (3), black varnish (1) and rubbing varnish (2), and two 1,000-gal. tanks for linseed oil and turpentine. The tanks beneath the self-measuring pumps are equipped with floats connected through chains to indicators beside the pumps in the stock room.

MOTOR DRIVE KEEPS STOCK ROOM CLEAN

A major factor in the selection of the motor drive for the machinery in the paint stock room was the elimination of the extensive amount of belting and shafting so generally associated with this class of work. This virtually does away with the throwing of dirt and flaky scales and helps in the preparation of purer colors. The use of induction motors also does away with the objections common to direct-current commutators. In general, the motor starters in the stock room are mounted

on columns adjacent to the controlled machine units and the wiring is carried in iron conduit. In addition to the complete automatic sprinkler installation, the paint shop is equipped with chemical extinguishers and a private fire alarm box, with standpipe and hose centrally located.

A great variety of paints are prepared at Everett for use in all parts of the system. A few of the more important preparation jobs are described in the following paragraphs:

Putty is made up in the mixer in batches of 350 lb., about 4 hours being required. Red putty is made by mixing 330 lb. whiting, 25 lb. oil lead, 7 gal. linseed oil and 10 lb. dry Venetian red. The last ingredient is omitted in making white putty. The red putty is used largely in setting sash in cars with cherry trimmings, the white being used mainly in setting sash outside buildings. In the mixer the putty is rolled by a 900-lb. steel wheel, whereas by the old hand methods only 25 lb. was kneaded at once.

Semi-white lead paint is used largely around stations. In a typical batch about 575 lb. of white lead is broken up for an hour in the lead cutter, and with 3 gal. of linseed oil and 15 gal. turpentine the mass is agitated in one of the 200-gal. tank mixers for 4 to 5 hours, the necessary colors being added during the latter process. The paint is then drawn as required from the agitator tank.

Structural gray paint is used largely on the elevated structure. About 1,200 lb. of white lead is prepared in the lead cutter. Zinc white, ground in oil in the water-cooled mills, is added to the white lead and made into a paste. To this are added 400 lb. of French yellow ochre ground in oil and 60 lb. oil lampblack; 70 gal. of linseed oil is then added, the proper colors having been added during the grinding process in the 200-gal. agitators. The paint is served as required from the agitator tanks.

Dry red lead is hand-mixed into a batter with oil and thinned with turpentine and driers. It is then delivered over the counter to the painters.

The ground color used as a base for orange enamel consists of white lead, red lead and golden ochre. They are mixed and thinned with turpentine and drier to form a flat color. About 60 gal. is mixed at one time in the agitators near the pebble mill and drawn off as required. Lead color, used on trucks as a base for green enamel, consists of white lead mixed with lampblack in oil and thinned with turpentine and driers. The mixing is done in the same agitator battery.

Surface car gray roof paint is an oil paint consisting of white lead mixed with oil lampblack and thinned with linseed oil and driers, with the addition of a small quantity of turpentine. The paint used for elevated car roofs is an oil paint consisting of white lead and French ochre in oil mixed with Venetian red which has been ground in oil in the agitators. This is thinned with linseed oil and driers. Plow paint is made in the

PAINT STOCK ROOM MACHINES, MOTOR DRIVEN

Ref. Letter	Description of Unit	Manufacturer	Hp.	Manufacturer	Type	R.P.M.	Control Information
A	200-amp. safety switch	J. H. Day Company	3	G.E.	KT 938	1,200	CR 1,038 G.E.
B	Puttychaser, 48-in.	J. H. Day Company	5	G.E.	KT 946	1,200	CR 1,038 G.E.
C	Three heavy-duty mixers	J. H. Day Company	5	G.E.	KT 946	1,200	CR 1,038 G.E.
D	50-gal. white lead mixers	J. H. Day Company	5	G.E.	KT 946	1,200	CR 1,038 G.E.
E	80-gal. portable mixers	J. H. Day Company	5	G.E.	KT 946	1,200	CR 1,038 G.E.
F	Ten 10-gal. portable mixers	J. H. Day Company	5	G.E.	KT 946	1,200	CR 1,038 G.E.
G	Paint grinder	J. H. Day Company	5	G.E.	KT 916	1,200	CR 1,038 G.E.
H	Electric oven						
K	Revolvator		4½			1,800	Trumbull switch, 150-volt, 30-amp.

same way except that burnt sienna is used in place of Venetian red.

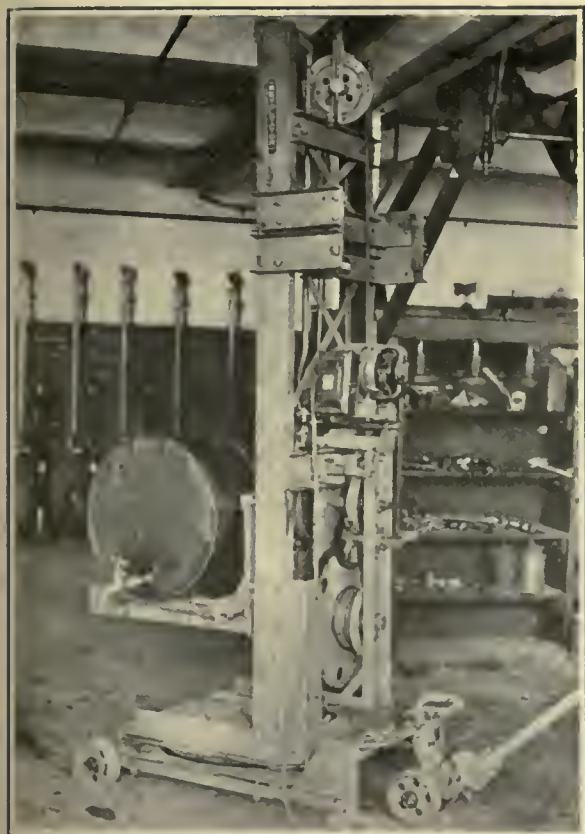
Cherry ground paint used on doors, sash, etc., as a base for enamel consists of white lead and burnt sienna mixed by hand and thinned with turpentine and drier. Bronze green used on service cars, coal cars, derricks, etc., is broken up in oil in the mills above mentioned and drawn for use.

Elevated car paint consists of white lead colored with raw umber, hand-mixed. This forms the basic color for the Pullman car enamel used on the outsides of the car bodies. On the insides of these cars white enamel and two shades of green enamel are used, the basic ground paint being white lead and green, thinned with turpentine and drier. All cars on the system are painted with white enamel on the insides of the roofs.

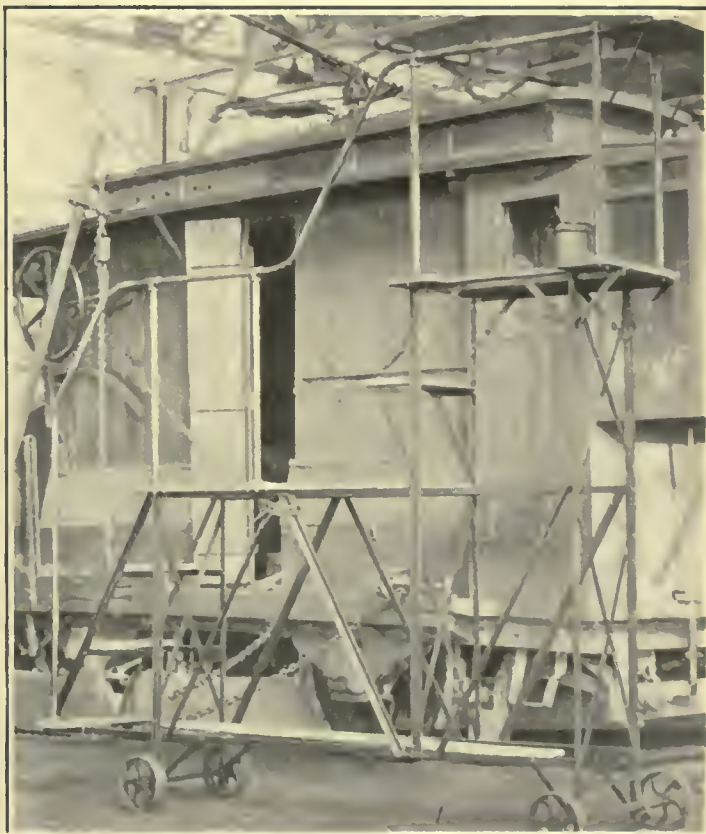
Truck paint is prepared by first boiling skins scraped

of red lead and wood is primed with a light-colored lead primer. Holes are puttied and dented spots looked after. The roof is painted a battleship gray and the main body coat is applied. This kills the green color without changing the color of the finish coat. When the main body coat is dry an enamel coat is put on the body and sash. While in some cases the enamel is the final coat, it is customary to finish with a varnish coat in order to increase the life of the enamel. The numbering and lettering follow the finish coat.

While the exterior is being painted, the repainting of the interior is in progress. As a rule this includes only the sash, doors and headlining, the rest of the work being varnished. The conductor's stand, brake staff and air piping are blacked off and usually the floors are given a heavy coat of dark gray oil and lead paint. The ceiling is washed and touched up with white



Revolver Used In Paint Stock Room



Scaffolding Mounted on Wheels for Painting Exterior of Cars

from pots in a steam-jacketed kettle. Linseed oil is gradually added. After straining, 150 lb. of white lead is added to each 25 gal. of boiled skins to give the necessary body. This is done in the agitator tanks and lampblack and umber are added, thinning with linseed oil and turpentine to obtain the proper consistency.

CARS ARE BEING REPAINTED ORANGE COLOR

At present the railway is repainting its surface cars orange for the sake of increased visibility over the previous standard dark green. This work will probably take three years. About four days is required to repaint an average car. The car is thoroughly cleaned, scraped and sandpapered, stripping to the bare metal or woodwork. A chemical paint remover is used where necessary. Nearly three-fourths of the cars are steel units. The paint is scraped into a hand truck equipped with a detachable hopper from which the paint refuse is later emptied and burned. Bare metal is given a coat

of red lead and wood is primed with a light-colored lead primer. The body is in hand. After the last coat is put on and is dry the glass is cleaned and the brasswork, seat backs, seats and screens are put in place. Small hand trucks, one for each car, are used to hold the entire set of seats. These trucks are of the flat platform type with racks built of 1-in. x 1-in. angles. Screens are dipped in a tank near the south end of the shop and if any enamel baking is required two electric ovens are available.

One man is assigned to roof painting and at the same time two men clean the car body and apply the priming coat. The roof dries in about 24 hours and the car body from 24 to 48 hours. Two painters then enamel the body and one enamels the sashes. Forty-eight hours later two men varnish the body, sash and doors. One man paints the trucks with one coat, which dries in about 24 hours. On the car interior three men are usually required.

Three electric ovens are being used in baking enamel at the Everett shops. These were designed and built by the Oven Equipment Company, New Haven, Conn., electrically equipped by the Westinghouse company, and with Bristol temperature control. One 33-kw. and two 10-kw. ovens are in use. One of the latter is in the temporary machine shop and the two others are in the paint shop near the paint stock room.

The larger oven is designed to accommodate a car truck. The outside dimensions are 8 ft. wide, 7 ft. 6 in. high and 7 ft. deep. Heaters are placed on the side walls and are covered by screening to prevent damage by contact. A motor-driven blower and duct system above the heaters circulates the heated air through the oven. The motor and fan are mounted on the roof. If desired, the oven may be moved on rollers as a unit or taken down in sections and transported to another location without injury to the insulation. This oven is used chiefly for baking enamel on automobile hoods, mud guards, fenders and other large pieces. About 10 minutes' baking at the maximum temperature of 365 deg. F. is required.

The smaller oven in the paint shop is used chiefly in baking enamel on light work. Hand strap brackets and conductors' seat stands are ordinarily baked an hour at 350 deg. and tin cases for car signs 10 minutes. Car springs are also enameled in this oven, one hour at 350 deg. being required per batch.

Car screens are dipped once each by hand in a tank of Watertown black and dried on a rack in the paint shop. A tank is also provided here for washing and bleaching car seats with oxalic acid. Used sign cloths are passed through the washing tank and are then used as old rags. A tank with a roller is provided for coating canvas with lead paint. Three men can put through 650 yd. in an hour, compared with three weeks by the old methods of hand painting.

Beading is run through a staining tank 27 in. wide and 8 ft. long, mounted about 3 ft. 6 in. above the floor and equipped with hinged wipers of plush, each about 6 in. wide and 1½ in. thick. These wipers are clamped in pairs to the top edges of the tank. The beading strips, a dozen or more at a time, are dipped in the stain solution and pulled through the wipers by hand. At least twenty times the length of beading can be stained in this way per hour as was possible with the old methods of brush coating.

The sign painting section occupies a rectangular space on the balcony above the paint stock room, 75 ft. long by 35 ft. wide. Most of this work is done by hand except where several hundred small signs bearing the same designation are required. In the latter event, the silk stenciling process is used. Signs like "Enter at Front" and "No Smoking" are stenciled when required in quantities.

The eight easels provided for sign painting are used very extensively for painting Hunter signs, which the company has used for many years. The chairs are mounted on rollers to enable the painter to change position without rising. To keep the knees from striking the easel supporting leg and to enable the painter to move sideways without "hitching" his chair backward, the easel legs are curved inward, these legs being of 2-in. x ½-in. straps.

In painting Hunter signs paper patterns are used to outline the lettering and then the surface of the cloth is painted black around the letters, leaving these white. Patterns are stored in a portable rack made of 1½-in.

angles. It is 5 ft. 6 in. long, 4 ft. high and 2 ft. wide and has 11 shelves. The shelf bracing is of 1-in. angles and the rack easily will hold 2,500 "pounce" patterns of drafting paper. Hunter signs are rolled out flat on the floor in drying. From 6 to 8 hours is required to paint a 26-exposure Hunter sign and dry it.

These Hunter signs are painted on Holland linen and are given one coat of "Hunter sign black." This is made up in 17-lb. batches composed of 10 lb. oil lamp-black, 5 lb. Prussian blue, 1 qt. linseed oil and 1 qt. flex compound. If necessary signs can be painted with "drop black" and dried in about 2 hours. Tin signs are usually given two coats of lead paint and after lettering one of varnish. Sheet-iron illuminated signs are given two coats of black enamel and two coats of white lead for lettering. About 2 days is required for these signs. Miscellaneous wooden signs are hand-painted with two coats of white lead and one of enamel, the lettering being of drop black.

SAMPLING AND TESTING PAINTS

A convenient record of paint samples is kept in a series of slotted drawers in the paint stock room office. These drawers or sample boxes are of ½-in. whitewood and are each 11 in. long, 4½ in. wide and 5½ in. deep and are provided with inside vertical slots ⅜ in. wide and deep, spaced ½ in. apart. Each pair of slots holds a plate of white glass 5 in. square and ⅜ in. thick and each plate carries a paint sample with a paster card giving the data upon the former. Each drawer holds 14 plates and a cabinet is provided with a capacity of 30 boxes.

A testing rack for paints and enamels has been set up on the roof. This is of metal, 10 ft. long by 3 ft. 4 in. wide, with inclined plane surfaces carried 30 deg. from the horizontal and fitted with spring clamps by which the sheet-iron test plates can be fastened to the flat surface. There are three panels or flat test surfaces separated from each other by 1½-in. gaps for drainage and for hanging the test plates in place. The test plates are 11½ in. long by 5 in. wide. The ends are looped over to form an L-shaped piece, which helps keep the test piece in place in all weathers. The rack will hold 66 plates and faces the south. It is made with a frame of 1½-in. angles for uprights, with 3-in. upright channel braces in the center and is 4 ft. 4 in. high at the back and 3 ft. high at the front. The clamps for these test pieces are made of ½-in. brass pipe split at the ends and threaded inside to receive a bolt and spring under the testing surface. The clamps rest on ⅝-in. x ¾-in. rubber feet to prevent electrolysis. Holes drilled in the test plane receive the bolts holding the clamps in place and the rack is provided with metal feet about 3 in. square and is braced to a wall and stairway.

Twelve portable scaffolds are used for car painting. Each is about 8 ft. long, 15 in. wide and 9 ft. high. There are two platforms at different levels connected by four steps. These are carried on a frame of 1-in. angle irons and fitted with ¾-in. pipe railings, as shown in the illustration. The structure is mounted on four 8-in. diameter cast-iron wheels with a 2-in. tread. The difference in height between steps is about 1 ft. so that the painter can easily reach any part of the car body. He can propel the entire scaffold forward or backward without descending to the floor level. An 18-in. x 10½-in. shelf at the top carries supplies for the roof painter, and the steps can be used as platforms or for carrying supplies.

Sub-Surface Terminal for Los Angeles

Plans for Hollywood-Glendale-San Fernando Valley Subway, Now Under Construction, Have Been Altered to Include an Underground Terminal Station in a New \$4,000,000 Building for the Pacific Electric Railway—Provision Will Be Made for Other Subways Planned for the Near Future

INSTEAD of a surface terminal at Hill Street, Los Angeles, for the Hollywood-Glendale-San Fernando Valley subway, now being built by the Pacific Electric Railway, the plans have been changed to call for the construction of a sub-surface station in the basement of a large new terminal building. The former plan, which was briefly described in *ELECTRIC RAILWAY JOURNAL* for Sept. 6, 1924, called for five loading and unloading tracks at the street level, together with platforms and other station facilities. Under the new plan the sub-surface terminal will have the same number of tracks, but will be entirely below ground. An additional expenditure of about \$500,000 will be necessary.

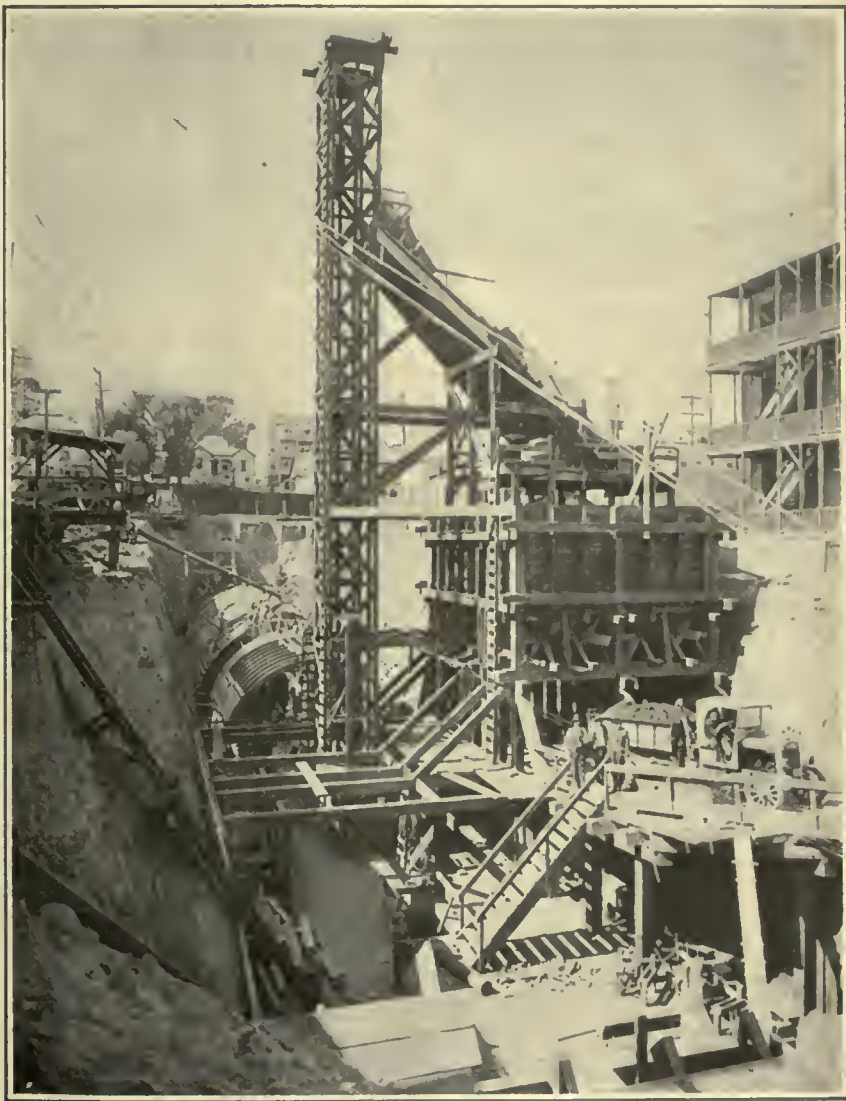
Authorization for the change was made on Jan. 5 of this year by the California State Railroad Commission. As a result it is expected that the tunnel will not be completed until Oct. 1, instead of next March. The feasibility of connecting the subway now under construction and the new terminal with a general subway system for the city was an important factor affecting the decision to depart in this way from the original plans.

PROGRESS OF SUBWAY DIGGING IS RAPID

In order to complete the new subway in record time, the work has been carried on in three places. After starting the initial bore eastward from First and Glendale Boulevards the contractor then began to dig both east and west from a section temporarily opened up between Flower and Figueroa Streets. Three shifts totaling 650 men are employed. During December progress on the three bores totaled 780 ft. This was an average of about 30 ft. per working day. The placing of the concrete lining was accomplished at approximately the same pace.

Excavated material is hauled out of the subway in small cars operated over a light railway. By this means it is brought to the foot of a hoist, which raises it and drops it into a bunker just below the street level. From this bunker trucks haul the soil away. Arrangement of apparatus for doing this is shown in the accompanying illustrations.

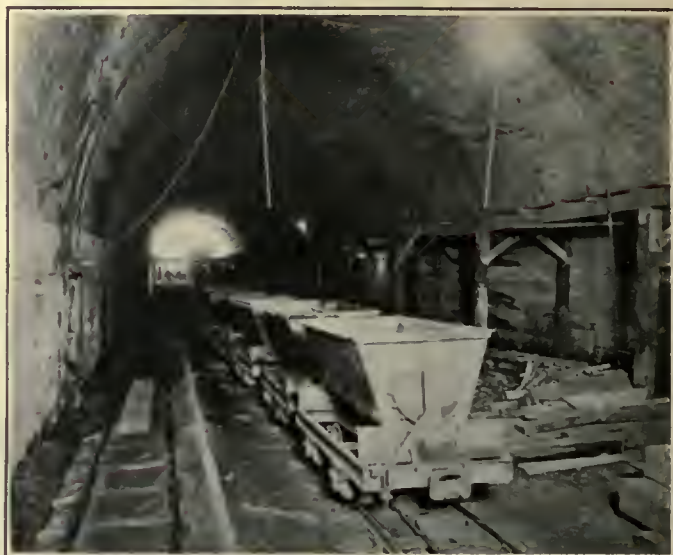
Conditions of soil so far encountered have been favorable for progress except for the presence of a certain amount of water. Emergency timbering at loca-



Waste Is Here Lifted from the Subway Level and Deposited in the Bunker, from Which Motor Trucks Haul It Away

tions where water was encountered, however, has enabled the work to proceed without interruption. On the basis of 4,250 ft. of actual tunneling to be done the excavation and placement of reinforced concrete on Dec. 1 was approximately 71 per cent complete, a total of 3,040 ft. having been dug. There remained some 500 ft. of difficult going eastward from Flower Street to the Hill Street station. It is expected, however, that the actual digging will be completed in the spring, although the construction of the terminal building and approaches will postpone the completion of the entire project until some time in the early fall.

Following the decision of the Railroad Commission in the matter of changing the grade of the subway terminal, it has been decided to erect a large \$4,000,000



At Left—By Working 24 Hours a Day in Three Shifts the Railway Has Been Able to Dig the Subway at a Speed of About 30 Ft. a Day. At Right—Excavated Material Is Carried from the Bore to the Foot of the Haulst by a Light Railway

terminal building on the site of the Pacific Electric Railway's present Hill Street building. The exterior of the new terminal will be of granite and terra cotta. Schultze & Weaver, Los Angeles and New York, are the architects. Leonard Schultze, who prepared the plans for the new Los Angeles terminal, also designed the Grand Central Station in New York City.

Reinforced concrete construction will be used for the new building, which will be 12 stories in height. Space for 600 offices will be provided. The main entrance to the building is from Hill Street, leading to an arcade 130 ft. long and 30 ft. wide, with shops on both sides. There will be eight passenger elevators, six at the Hill Street entrance and two on the Olive Street side. On this side there will also be a garage to accommodate the automobiles of the tenants. It will have a capacity for 128 automobiles on two floors. Direct entrance will be had from Oliver Street to both floors. The fact that the basement of the building is to be used as a railway terminal necessitated the location of the fire room above the street level, which presented some unusual problems in building design.

The subway terminal in the basement will have five tracks, accommodating 30 cars. Six inclined ramps will connect the boarding and alighting platforms with the first floor, where the waiting room and ticket offices will be located. The ascent will be broken, however, by a mezzanine floor with a smaller waiting room between the track and the street levels. The railway estimates that 50,000 persons a day will use the new terminal upon the completion of the subway now being built. This number will be greatly augmented when other subways are dug and connected up.

The first subway to enter

the terminal will be the one now nearing completion, which will serve the northwest part of the city. This \$3,500,000 project will take the Hollywood, Glendale, Santa Monica via Sawtelle and San Fernando Valley cars off the streets in the congested districts. When future traffic needs make necessary a subway specially to serve the Santa Monica Bay district the building will be enlarged to take care of this development.

LOCATION OF INTERURBAN TERMINAL WILL STABILIZE BUSINESS DISTRICT

It is thought that the decision to build the subway terminal in this location will be far reaching in its effects. It means the stabilization of the present central business district, the status of which has heretofore been somewhat uncertain because of the tremendous growth of the city. This has been unrestrained by any definite plans of development, particularly in the business section. Experience in large Eastern cities is considered to have demonstrated the fact that a constantly shifting business center is detrimental to the best interests of the city. The location of Los Angeles' first subway terminal on Hill Street and the decision to create a civic center not far away are expected to have an important influence in keeping the main business district centralized.

The construction of this new terminal means the realization of a dream which originated with the late E. H. Harriman more than 20 years ago. At that time Mr. Harriman even went so far as to have plans prepared for a large office and subway terminal building on this same site. While the present plans differ from his in many ways, the idea followed in its construction now is the same as then.



New Terminal Building of the Pacific Electric Railway in Los Angeles Means the Realization of a Dream Originating with the Late E. H. Harriman

Service Readjustments Would Increase Atlanta Earnings \$700,000

Beeler Report States that Elimination of Jitneys and Rerouting of Street Cars of Georgia Railway & Power Company Would Increase Railway Revenues and Reduce Operating Expenses—Relocation of Car Stops Would Speed Up Service — Co-ordinated Railway and Bus Operation Is Recommended

BESIDES the physical improvements in transportation facilities in Atlanta recommended in the recent report prepared by the Beeler Organization, and described in ELECTRIC RAILWAY JOURNAL for Jan. 10 and 24, extensive changes in bus and car routes and service are proposed. Under the new plan the report states that there would be an increase of about \$700,000 a year in net earnings and a reduction in the operating ratio from 89.7 per cent to 77 per cent.

As the first step in any program to improve transportation conditions, the present jitneys must be eliminated. Not only have they taken about 10 per cent of the business that should have gone to the railway and thereby injuriously affected the income of the company, but they have added to the already serious traffic congestion in the business district. Moreover, they afford no material addition to the transit facilities to compensate for the damage they are doing.

Jitneys have been in operation in Atlanta for a number of years and recently have become a formidable competitor to the street railway. At the time the report was made there were no fewer than 230 jitneys of all classes in daily operation, mostly 5-passenger vehicles. They operate over and along the best lines of the railway where short-haul riding makes the remuneration from operation favorable.

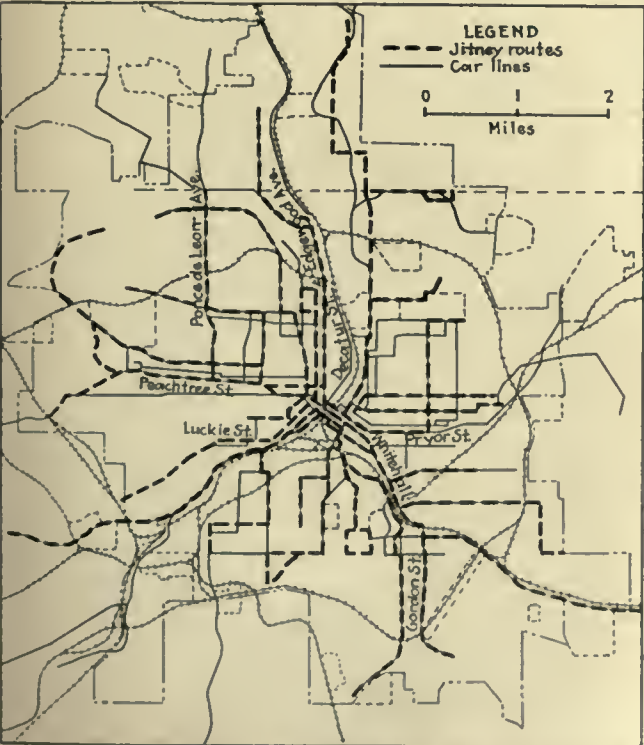
Checks made by the Beeler Organization showed a total of 23 jitney lines, all of which are being operated along the railway lines. Nineteen of the lines operate between residential sections and the business sections only, while four operate through-route city service. The routes are shown on an accompanying map. The jitney fare is 10 cents straight on 14 of the lines, and

ANNUAL PASSENGERS CARRIED BY TRANSPORTATION AGENCIES IN ATLANTA			
	Railway	Jitney	Total
Revenue.....	73,413,026	7,750,000	81,163,026
Transfer.....	19,967,265		19,967,265
Total.....	93,380,291	7,750,000	101,130,291

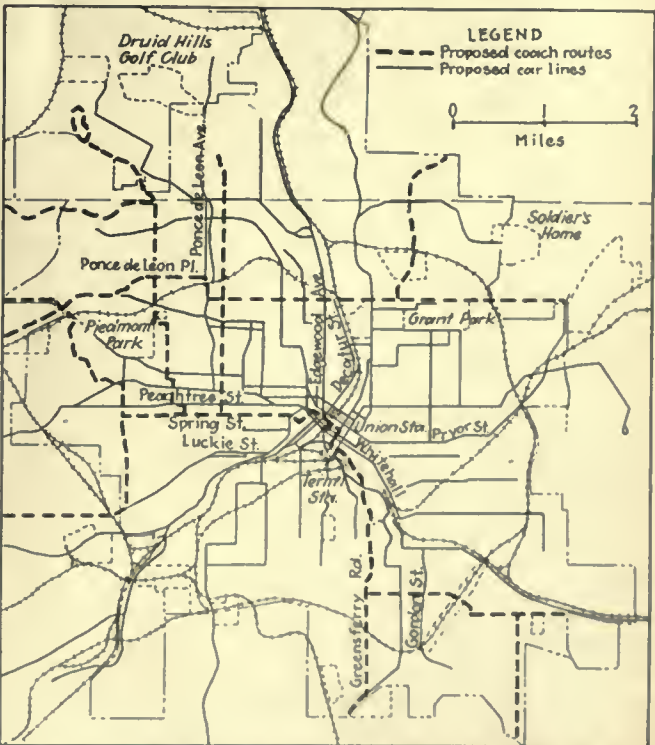
7 cents on nine lines. Railway car fare is 7 cents, and the ticket rate is 6½ cents.

To determine the volume of the jitney business, a complete field survey was made. By comparing traffic counts on the jitneys with similar data for the street cars it was clearly seen that with the exception of a few lines during the rush hour the seats furnished by the railway were adequate to care for all the traffic that presented itself.

The comparative figures in the table in this column give a good idea of the annual volume of business handled under present conditions.



Present Jitney Routes in Atlanta Follow the Car Lines and Operate Only in the Choice, Well-Populated Sections



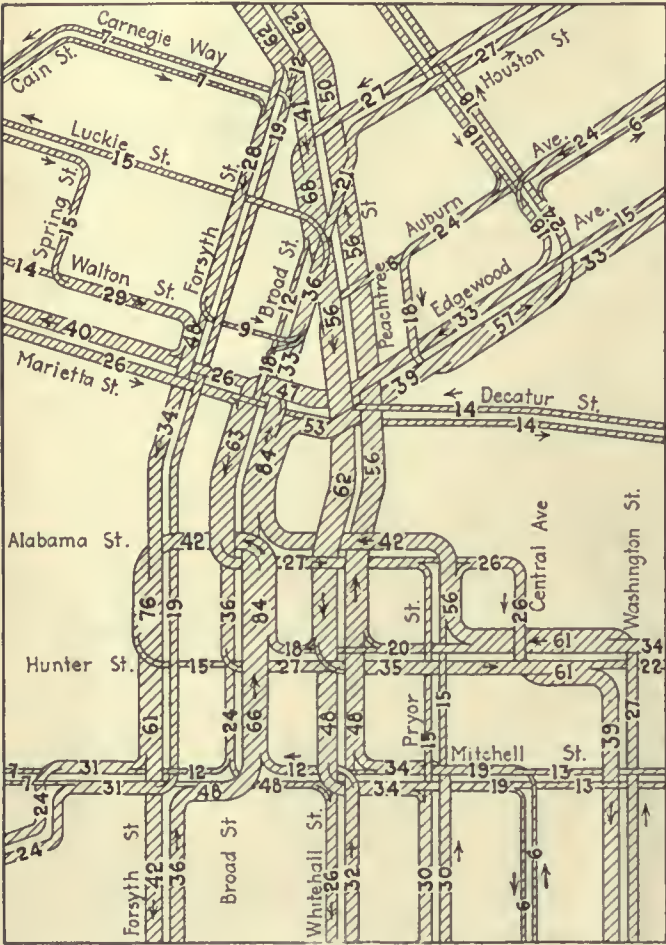
Bus Routes of Co-Ordinated Service Plan Prepared for Atlanta by the Beeler Organization

Of the total of 80,000,000-odd revenue passengers, the jitneys carry 7,750,000, or nearly 10 per cent. They are all revenue passengers and largely short riders, leaving to the railway 20,000,000 free transfers, the long-haul riders, and the problem of caring for the rush-hour maximum demand.

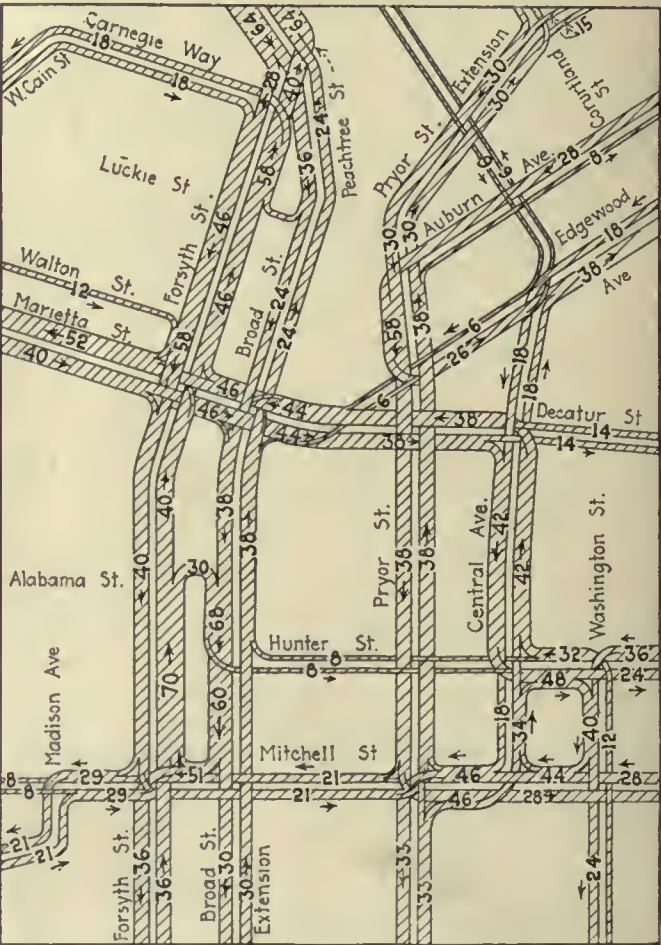
Increasing concentration of traffic in the business district presents another phase of this problem. Within the last 5 years the number of motor vehicles has increased practically threefold and is still climbing.

riders, however, while the street cars carry 88 per cent. Were all these riders accommodated by street cars exclusively, the number would have to be increased by 48 per hour, bringing the total up to 394 cars per hour. Were conditions reversed and jitneys used exclusively, the report says that the number required would be 5,150 per hour, or more than eight times as many as now.

While the total mileage of the railway is but 40 per cent more than that of the jitney, it transports



Present Car Routing Is Responsible for Many Turning Movements in the Congested District



Removal of Cars from Peachtree Street Is a Feature of the Proposed Routing Scheme

Checks showed that of the total vehicle traffic during the evening rush hour on Houston Street at Peachtree, one of the most congested corners in the city, one-fourth was jitney traffic.

The relative value of the street car for handling public transportation as compared with the jitney including the buses, as now operated, is shown in the following tabulation, which gives the approximate number of street cars and jitneys entering and leaving the central business district on a typical weekday during the peak of traffic, from 5 to 6 p.m.:

RELATIVE RUSH-HOUR TRAFFIC ON CARS AND JITNEYS		
	Street Cars	Jitneys
Number of units.....	346	623
Passengers.....	16,286	2,260
Passengers per unit.....	47.1	3.6
Per cent of units.....	36	64
Per cent of total passengers.....	88	12

During the maximum hour there are already 80 per cent more jitneys in the central district than street cars. They carry only 12 per cent of the revenue

10 times as many revenue passengers and is giving 529,000,000 seat-miles annually against 50,800,000 for the jitney. The speed of the jitney, viz., 12.85 m.p.h., is the greatest advantage it affords the patron; it is 37 per cent faster than the railway, and results in an average saving of about 4 minutes per ride.

Any appreciable increase in the number of jitneys operated, however, will slow the speed on account of the increased congestion. The speed of the jitneys at present is about the same as that of the street cars. On two lines the buses average respectively 9.2 and 8.9 m.p.h. With the improvement in schedules and routing of the car lines as proposed in the report it is estimated that the speed of the railway service will be raised from 9.37 to 10.32 m.p.h., which will tend to minimize the present difference.

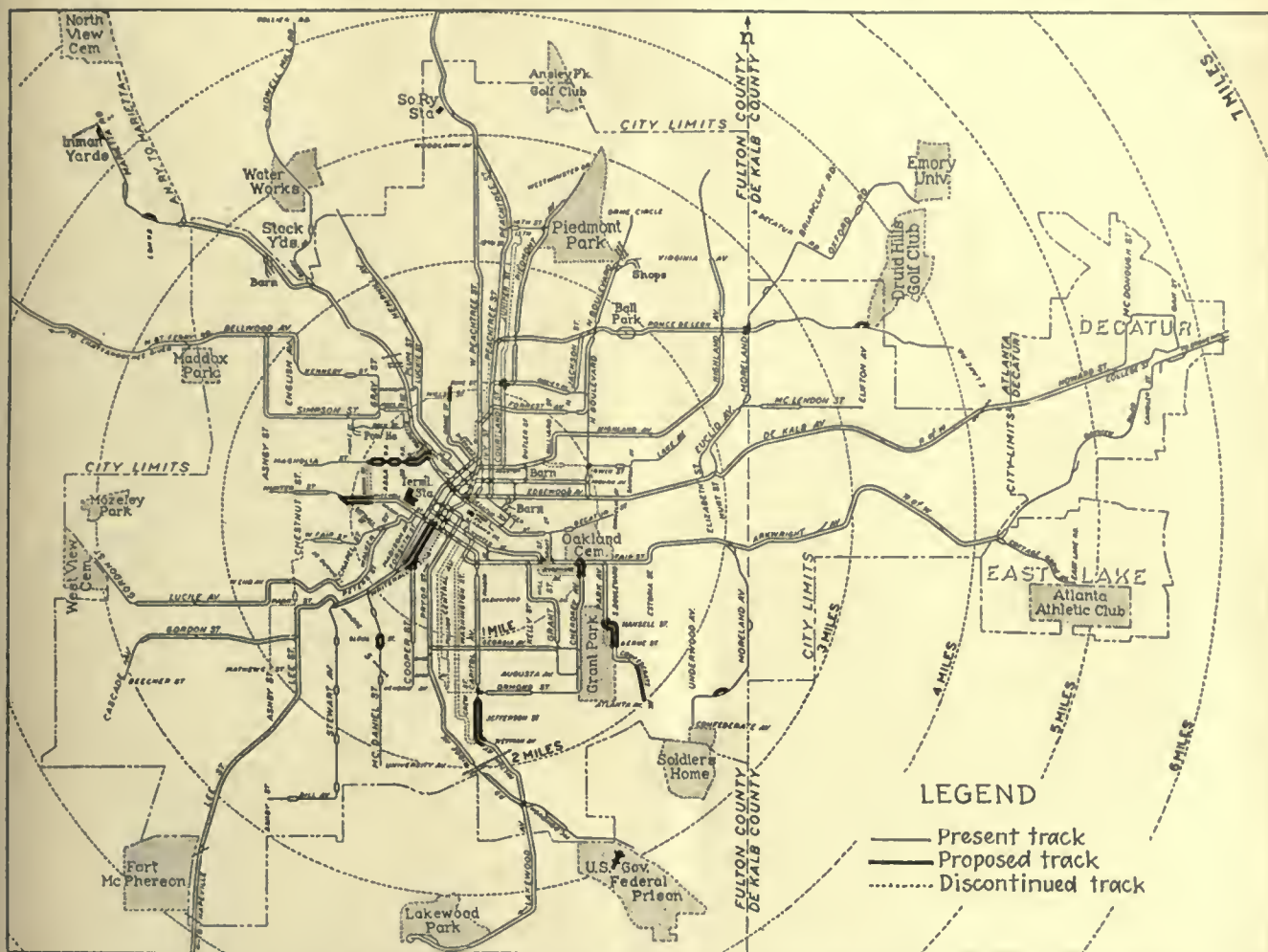
The average length of ride of each revenue passenger is 3.40 miles on the railway and 2.11 miles on the jitney, which results in receipts at an average rate per mile of 1.99 and 4.26 cents, respectively. The jitney rate is therefore 113 per cent higher than the street

railway fare, based on the average length of ride of the patrons of the respective services. If the railway charged the same rate per mile that the jitney rider now pays, the railway would receive 14.48 cents per revenue ride. These figures are based on the average distance actually traveled by the revenue passengers and represent the actual transportation requirements of the community regardless of trip length of either car or jitney.

The report emphasizes the fact that jitney operation

will tend to bring about an equalization of car traffic on the main business streets, enlarge the delivery area in the downtown district, minimize the turning movements on the heaviest traffic thoroughfares and provide for faster and more economical operation. In the proposed plan the through-routing feature is retained and communities of mutual interest connected wherever practicable. A number of routes are rearranged in order to obtain better balancing.

A general simplification of the railway movements



Track Changes to Cost More than \$500,000 Are Recommended in the Beeler Report. These Are Shown Here

has no place in any real transportation plan and should be eliminated forthwith. Until this is accomplished, no improvement in or expansion of the transportation facilities of the community is practicable.

PROPOSED REROUTING OF CARS

Another step in the direction of improving transit facilities is to reroute a number of car lines. At present the railway operates 23 city lines, of which 16 are through lines; the other seven turn back in the business district. A number of the lines extend beyond the present city limits; in fact, five of them are suburban. The number of cars passing along the various streets in the business district during the peak hours of the evening rush, given in an accompanying map, shows the multiplicity of turning movements at many of the busiest corners, and unbalanced traffic on some of the most frequently used streets.

A change in routing, as indicated on another map,

will be had while retaining for all routes easy access to the entire business district. Peachtree Street below Luckie will be left open to vehicular traffic only, thereby making three through streets, out of the seven from Spring to Washington, exclusively for such traffic. This should greatly facilitate the movement of all traffic and provide a purely vehicular thoroughfare in the center of the city.

In order to obtain preliminary relief, the Pryor Street viaduct, described in *ELECTRIC RAILWAY JOURNAL* for Jan. 24, must be constructed first. A temporary plan for relief can be instituted immediately thereafter. The final plan cannot be instituted in its entirety until both the Pryor Street and the Central Avenue viaducts are completed and the Pryor and Broad Streets openings made. All of these important improvements are included in the list of civic improvements mentioned in this paper last week.

As a result of the various routing changes, operation

will be discontinued on some 19.22 miles of track, while 7.82 miles of new track must be built. These items are summarized below:

NEW TRACKS TO BE BUILT IN ATLANTA	
18,000 ft. of straight track and 5,740 ft. of special trackwork inside of business district.....	\$305,055
14,985 ft. of straight track and 2,500 ft. of special trackwork outside of business district.....	200,553
Total.....	\$505,608

Some of the track abandoned is due for replacement soon, so the expenditure does not all represent the cost of the revised plan.

Many other service readjustments are recommended for adoption along with the new routing. At present an average of 5.6 stops per mile is actually made during the middle of the day, and 7.2 stops per mile in the heaviest direction during the rush hour. Within the 7-mile zone, which includes the suburban territory, the stops average 492 ft. apart, or 10.7 per mile. In the suburban territory the stopping places average about 8.4 per mile, and in the city about 11.5. Stop locations should be rearranged, the report states, in such a way that the average spacing will be about 650 ft.

Street car stops should be marked by distinct signs. This will avoid any confusion on the part of the patron as to the exact location of the stop. At heavy loading points where traffic stanchions or raised platforms are employed other signs are not necessary. Elsewhere, however, the trolley poles can be painted with light yellow bands about 3 ft. wide and having the sign "Car Stop" indicated thereon in black letters. This inexpensive and effective marking is visible at a distance, and instantly guides the patron to the stopping place.

At present on some single-track sections stop signs are placed on only one side of the street. This is confusing as the patron is apt to infer that there is another location for the stop in the other direction. To make the location more definite, a sign should be placed at every stop in each direction. Positive stops should be marked by signs suspended from the span wires. When the same location serves as a passenger stop and a positive stop, both signs should be displayed.

The extended use of the private automobile has emphasized the desirability for higher railway speeds wherever practicable. The jitney bus, unsafe and unreliable as it may be, secures considerable business by reason of its greater speed. At present, Atlanta's street cars make on an average only 9.36 miles per car-hour. Smoother traffic movements in the business district, the elimination of superfluous stops, double tracking of single-track lines now operating with short headways, wider entrances and exists, etc., will all be beneficial factors in speeding up the service. It is estimated that with these changes in effect the average speed can be brought up to at least 10.32 car-miles per car-hour, which is an increase of 10 per cent.

Regularity of service and even headways are of prime importance. If there is travel only sufficient to warrant a 15, 20 or 30-minute headway, patrons know when the car is due and they can readily adjust their movements to take a given car, but with cars running off of schedule, or on a schedule where odd headways are employed, such as 9, 14 or 17 minutes, it is very exasperating as patrons cannot readily calculate when a car is due. Car lines that are too close to each other frequently

make it necessary to dilute the service. Often the public would be much better served with one good line on a frequent headway than with two or more poor ones with infrequent headways. Discontinuance of some duplicate track is recommended to permit an improvement of headways on a number of lines.

A comparison of the total daily scheduled car-miles and car-hours present and proposed is as follows:

SUMMARY OF MOTOR AND TRAILER OPERATION		
	Present	Proposed
Motor Cars:		
Car-miles.....	38,361	36,959
Car-hours.....	4,114	3,593
Car-miles per car-hour.....	9.33	10.29
Trailer Cars:		
Car-miles.....	986	1,851
Car-hours.....	92	166
Car-miles per car-hour.....	10.69	11.15
Total Cars:		
Car-miles.....	39,347	38,810
Car-hours.....	4,206	3,759
Car-miles per car-hour.....	9.36	10.32

Under the proposed plan practically the same number of car-miles will be operated daily, viz., 38,810 against 39,347, but with a reduction of 447 car-hours daily. Additional trailer operation to the extent of 74 car-hours daily will replace motor car operation. This assists in obtaining a large proportion of seats with a minimum cost of operation. Approximately 100 car-hours added to the schedules proposed in this plan would give ample and satisfactory service to care for the additional patronage, if jitney operation were discontinued. On several lines the report recommends the establishment of one-man operation.

As a result of the changes recommended, there should be a marked increase in the net earnings of the railway. A comparison of the annual operations under the present and proposed plan follows:

FINANCIAL RESULTS OF PROPOSED CHANGES		
	Present Operations	Proposed Operations
Operating revenues.....	\$5,057,704	\$5,274,704
Operating expenses.....	\$3,827,346	\$3,330,646
Taxes.....	340,000	282,300
Renewals and retirements.....	374,000	450,000
Total operating deductions.....	\$4,541,346	\$4,062,946
Net earnings.....	\$516,358	\$1,211,758
Operating ratio, per cent.....	89.7	77.0

CO-ORDINATED BUS SERVICE

With competitive jitney operations effectively controlled, a co-ordinated system of railway and bus operation should be inaugurated, the Beeler report says, to serve the park, parkway and boulevard sections of the newer residential districts where the extension of car lines is not practicable. Two such districts already exist in Atlanta. One is Ansley Park and the section further to the north, including Morningside. Another district that is building up practically without car service is that along Virginia Avenue. Much of this development has been during the past year.

Immediate establishment of two bus routes and the subsequent addition of others is recommended in the report. About 15 coaches with garage and shop facilities will be required to inaugurate this system, involving an initial investment of between \$300,000 and \$350,000, depending upon the type of coach.

The cost of service per coach-mile was estimated for both single and double-deck types. The former type is best suited to operate on roadways with the high crown encountered in some of the residential sections.

ESTIMATED COST OF BUS OPERATION
In Cents per Bus-Mile

	Single Deck	Double Deck
Operating Expenses:		
Maintenance of equipment...	7.0	8.5
Conducting transportation....	13.0	18.0
Injuries and damages.....	1.5	2.0
General and miscellaneous.....	2.0	2.0
Operating expenses.....	23.5	30.5
Taxes.....	1.5	1.8
Renewals and retirements.....	3.7	4.7
Interest.....	3.3	3.8
Total cost of operations.....	32.0	40.8

The double-deck type, similar to that in use on Fifth Avenue, New York, would of course render an extremely popular type of service especially appreciated by the public during the fair and warm days and delightful evenings, but they would involve improvements to the roadways in numerous places. This type also costs more to install and more to operate.

A comparison of the essential financial and operating features, as estimated, based on an annual total of 735,000 bus-miles, is as follows:

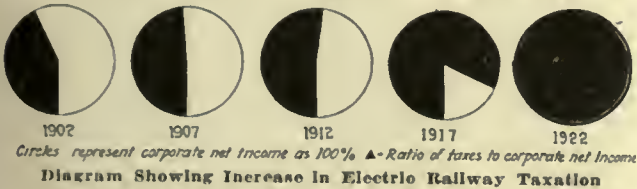
ANNUAL BUS OPERATING ESTIMATES

	Single Deck	Double Deck
Investment.....	\$300,000	\$350,000
Revenue passengers.....	2,200,000	2,600,000
Revenue at 10-cent fare.....	\$220,000	\$260,000
Operating expenses.....	\$173,000	\$225,000
Taxes.....	\$11,000	\$13,000
Renewals and retirements.....	\$27,000	\$34,500
Interest at 8 per cent.....	\$24,000	\$28,000
Deficit.....	\$15,000	\$40,500

From the foregoing it is seen that after providing for operating expenses, taxes, renewals, and a return on the investment, a deficit of \$15,000 for the single and \$40,500 for the double-deck type may be expected. In fact, if the organization does as well as this for the first year or so while the coach system is in the process of development, it will do better than similar enterprises have done elsewhere. Little or no additional overhead expense need be incurred in the operation. Harmonious co-ordination of the services will be readily established and an interchange of passengers by transfer will be possible.

Not a Picture of the Eclipse

THE accompanying diagram is not a series of pictures of the eclipse of Jan. 24, but a chart reproduced from the January issue of the *Journal of Land and Public Utility Economics* and from an article by Herbert E. Simpson on the taxes borne by the public service industry. This particular chart presents pictorially for a number of years the ratio of taxes of



electric railway companies to their corporate net incomes. It is based on census figures which show that during the last 20 years, while the gross receipts of the electric railways have almost exactly quadrupled, the expenses and the taxes have increased almost exactly five times. In consequence, in 1922, the taxes for all of the electric railway companies in the United States had become 53 per cent of all income, after expenses and charges, or more than corporate net income.

Campaign to Reduce Accidents

Boston Elevated Begins a Course for Platform Men Under Direction of Claims Department—Weekly Talks Sent to All Transportation Employees

A NOVEL method of getting the principles of accident prevention to the 3,900 men of its transportation department is being used this winter by the Boston Elevated Railway. A series of papers, prepared by the claims department staff, are being sent weekly to the men's homes. These papers are written as reports of meetings, presided over by General Manager Edward Dana, assumed to have been held just previously. The report form is used because it is both novel and interesting. In each "report" the "speaker" presents his "talk" and then answers questions which members of the audience are supposed to have asked.

The first "report" was that for Jan. 7, and the program of "talks" as announced in a preliminary bulletin sent to the men is as follows:

"Accident Prevention," by Russell A. Sears, general claims attorney.

"What Claims and Suits Against the Railway Mean to the Public and the Railway," by Maurice P. Spillane, attorney.

"Accident Reports," by John J. Reynolds, claims attorney.

"Obtaining Names of Witnesses," by Michael F. Doyle, chief investigator of claims.

"Boarding, Alighting and Falling Cases," by E. F. Livingston, chief investigator of litigated claims.

"How Accidents Are Paid For," by David F. Lee, chief clerk claim department.

"A Few Things I Have Heard in 25 Years in the Claim Department," by Mary F. Donnelly, head stenographer claim department.

"What the Original Accident Looks Like in Court," by Rupert L. Mapplebeck, trial attorney.

A feature to stimulate interest in the "talks" is that the company has offered during May to give such employees as desire to do so the opportunity to take an examination on their contents. The two employees in each division who in the opinion of the judges pass the best examination and whose accident record since Jan. 1 has been meritorious will be suitably rewarded. The company has announced that, in the examination, handwriting will not be counted, nor will the style be considered. The criterion will be the knowledge of the subject and the common sense shown in the answers to the questions.

In the first "talk," Mr. Sears pointed out the great care required to avoid accidents in the crowded streets of the present-day city, and that under the Massachusetts law a trolley car has no superior right of way over other vehicles on the street. Hence, the ringing of a gong is simply a warning, not an order. He touched on the special care needed to avoid accidents to children and the duties of the conductors in regard to closing car doors.

In the second "talk," given by Mr. Spillane, the speaker explained why every accident presents a possibility of a claim, and he gave statistics of the accidents, claims, damages, etc., of the company during the past 2 years and what these claims meant in the way of fares paid.

In the "address" of Jan. 21, John J. Reynolds emphasized the importance of reporting all accidents "promptly, accurately and fully," getting all the witnesses possible.

These "talks" are the outcome of a meeting of several hundred transportation department men held last year.

Track Machinery Combined Into a Single Unit

By Mounting Its Cutting, Welding and Grinding Equipment on an Automobile Trailer, the Eastern Massachusetts Street Railway Has Made It Possible for Fewer Men to Complete Reconstruction Jobs in Shorter Time

THE construction by the Brockton division of the Eastern Massachusetts Street Railway of a trail truck to carry various pieces of track machinery that were formerly transported as separate units has increased to a marked extent the efficiency with which construction jobs are done. For the installation of special work or the rebuilding of short sections of track a number of different machines are required. Plate welding requires two men and one machine. Surface welding and grinding require other men and more machines. Moreover, when switches, frogs or mates are installed, it is frequently found that compromise joints, or plates, do not fit and it is then necessary either to send them to the nearest shop or to take an oxyacetylene outfit to the job.

To reduce the waste of time and avoid duplication of movement, the railway has combined cutting torches, surface welders, surface grinders and a seam-welding outfit into a single unit. This is a 3-ton trailer which is operated by one man and his helper. When not actually welding or grinding at welders' wages of 60 cents an hour, these men are working at laborers' wages of 50 cents an hour. Two men and this single unit are now able to do the work which formerly required five men and four different kinds of equipment.

The two tanks for the oxyacetylene cutting outfits are carried on the rear step of the trailer. Sufficient hose is provided to reach any rail of double track while the vehicle remains near the curb. Welding apparatus is carried on the back part of the trailer while a universal grinder is located on the forward part. A box has been provided for the welding apparatus so that it can be lifted off the trailer platform if needed for use elsewhere. The equipment is a standard General Electric welding machine with a reverse polarity switch, so that it can be used also for surface welding.

Between the welding apparatus and the oxyacetylene tanks a smaller box has been provided for tools. All



One Man Can Raise or Lower the Universal Grinder to the Street by Means of a Crank Windlass. Note the Struts to Keep the Trailer in a Horizontal Position

track tools that might be needed on a small job can be carried in this box. It is of sufficient size to hold comfortably a Jackson tie-tamping outfit. Another smaller tool box for the operator's hand tools is swung beneath the trailer.

The front platform has been lengthened to provide room for a Universal chain-driven grinding machine. Inclined skids permit the grinder to be rolled down to the ground and up onto the platform. When not in use the skids are carried lengthwise under the body of the vehicle, as shown in an accompanying illustration. A crank windlass has been installed so that this heavy machinery can be raised and lowered by one man.

A spring drawbar connects the trailer to the motor truck. Safety chains prevent any possibility of accident should the drawbar break. At each end of the platform there is a strut which keeps the trailer in a horizontal position after it has been detached from the motor truck. Wheel chocks are provided to hold the trailer when it is necessary to stop on a grade.

For small jobs the trailer can be moved easily by hand. The struts have small wheels at their lower end to facilitate these movements. When it is necessary to move the vehicle more than 200 or 300 ft., the struts are pulled up out of the way and the trailer is moved by motor truck.



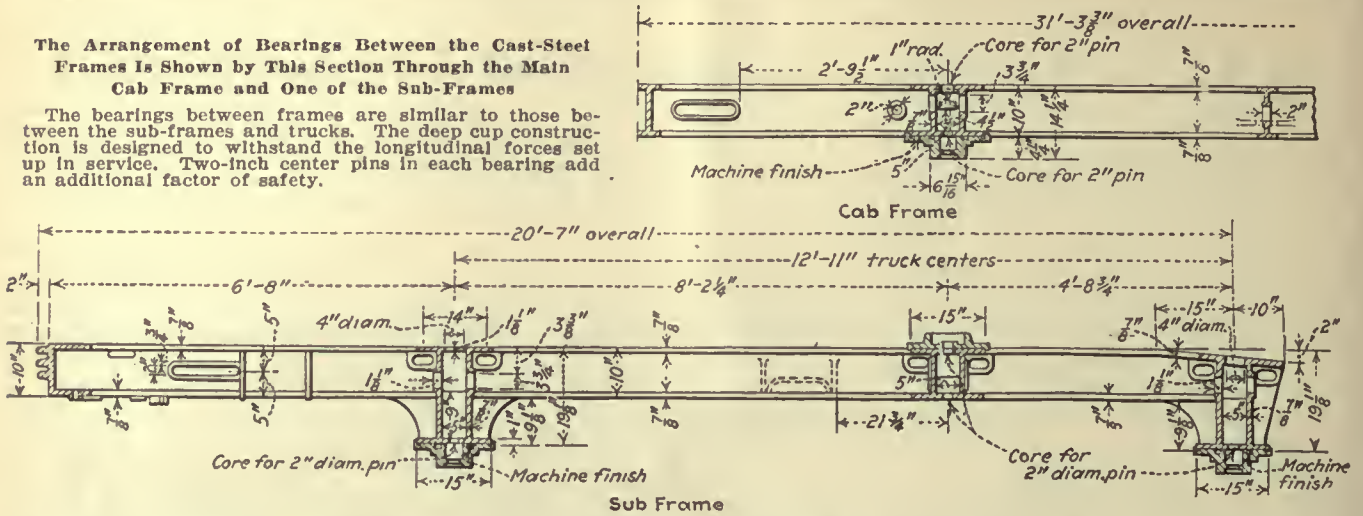
This Trail Truck Has Been Designed by the Eastern Massachusetts Street Railway to Carry All the Machinery Needed for Small Track Construction Jobs



Oxyacetylene Welding Tanks Are Carried on a Rear Step. The Skids Are Carried Lengthwise Underneath the Platform

The Arrangement of Bearings Between the Cast-Steel Frames Is Shown by This Section Through the Main Cab Frame and One of the Sub-Frames

The bearings between frames are similar to those between the sub-frames and trucks. The deep cup construction is designed to withstand the longitudinal forces set up in service. Two-inch center pins in each bearing add an additional factor of safety.

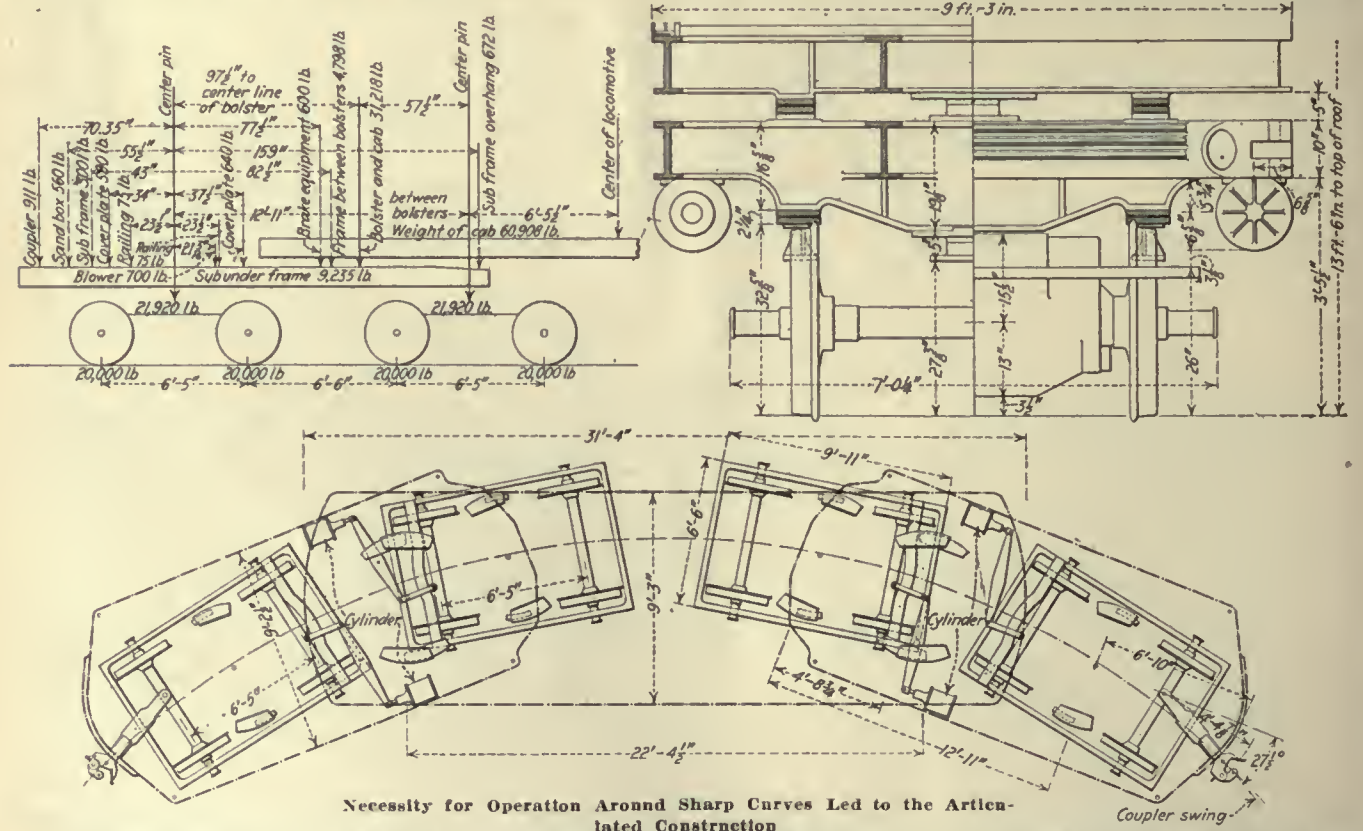


heavy for passenger service were in good condition and were completely overhauled before installation on the locomotives. In the second place it was considered a much simpler matter to apply forced ventilation by external blowers to a freight locomotive than would be the case on passenger cars.

In the articulated design as finally developed, the main cab frame is carried on two sub-frames, each of which in turn is mounted on two trucks, thus making four trucks and eight motors under the complete unit. The bearings between the main cab frame and the sub-frames are similar to those between the sub-frames and the trucks. They are of a deep cup type, as shown in the accompanying longitudinal section through the center line of the frames. These bearings are liberally designed to take the maximum end thrusts developed and are provided with 2-in. center pins.

Both the main cab frame and the two sub-frames are made of one-piece steel castings. These are excellent examples of high-grade steel foundry work, because of the large over-all dimensions and comparatively light sections. They were made by the Commonwealth Steel Company of St. Louis. The three frames forming one complete unit are shown in an accompanying illustration.

To obtain the necessary weight, the main cab frame is filled with ballast consisting of concrete and iron punchings. This is supported by 1/2-in. boiler plate, put in buckle-plate fashion and resting on the lower flanges of the I-beam sections of the casting. In the completed locomotives, the top of that portion of each sub-frame which extends beyond the cab is covered with 1/2-in. diamond checked floor plate. This is riveted to the cast-steel frames, and the seams are then welded together.



In the upper left of this drawing is shown a load distribution diagram, arrows indicating center of gravity of equipment named.

Although the locomotives weigh 80 tons, the load per axle is only 20,000 lb., or 10,000 lb. per wheel. Vertical clearances above the rail are shown in the cross-section below.

tion at the right of the illustration, while the position assumed on a curve by the frames and trucks is shown in the drawing below.

The bearings between the cab frame and the sub-frames are located so as to give equal distribution of weight to all wheels. The main frame weighs 11,000 lb. and each sub-frame weighs a little more than 9,000 lb. With the cab and apparatus mounted, and with ballast, the complete body weighs 60,908 lb. It will be noted from the illustrations that the bearings on the sub-frames are 1 ft. 8½ in. inside the center line between the trucks at each end, in order to balance the overhang of the sub-frames and the apparatus mounted on them.

FOUR TRUCKS EQUALLY SPACED

The locomotives are 52 ft. 5 in. long over the bumpers. Bearings between the main frame and the sub-frames are spaced 22 ft. 4½ in. apart, and all four trucks are equally spaced on 12-ft. 11-in. centers. The cab is 31 ft. 4 in. long, 9 ft. 3 in. wide, and 13 ft. 6 in. high from the rail to the top of the roof. With 33-in. wheels, the top of the sub-frame at each end is 4 ft. 3½ in.

tion at 2,000 r.p.m. on 600 volts, and are connected directly to the line with no starting resistance. It is estimated from tests that the safe capacity of the motors is increased to 125 hp. on a 1-hour basis without excessive temperatures, as a result of the ventilation supplied by the blowers.

MULTIPLE-UNIT CONTROL

General Electric type-M multiple-unit control is used. This includes a C-6 controller at each end of the locomotive, with type 13-DB-41 contactors and one DB-22-B reverser for each set of four motors. Through the use of multiple-unit control, the locomotives can be connected together to haul loads in excess of the capacity of a single unit. The contactors are mounted in a special frame on the interior of the cab where they are conveniently accessible, and the motor cut-out switches are placed in a special panel box built at one end of the contactor frame.

Compressed air for brakes is supplied by two D-4-P



The Three Cast-Steel Frames for One Complete Unit Are Shown Here in Their Relative Positions

Large over-all dimensions and comparatively small sections made a difficult steel foundry problem. The castings for all six

locomotives were made by the Commonwealth Steel Company of St. Louis.

above the rail, and the distance from the rail to the top of the cab frame is 5 ft. 6½ in. Side bearings on the trucks and between the main and sub-frames are of the plain rub-plate type. Accompanying illustrations show the heights of the various parts above the track, and also the position assumed by the trucks and sub-frames on a curve.

Two blowers supply the ventilating air to all eight motors. Each of these is a Sturtevant single-width, single-inlet, multivane fan, delivering approximately 300 cu.ft. of air per minute to each motor. They are mounted in sheet metal housings, one on the platform at each end of the locomotive. These housings are provided with deep louvers designed to prevent rain or snow from being drawn in with the cooling air. The air is delivered through slide dampers to 5-in. round galvanized sheet-metal ducts, a separate duct being provided from the fan housing to each motor. Malleable-iron elbows connect these ducts with flexible bellows, approximately 10 in. long, at each motor. The general arrangement is shown in the accompanying drawing which is a longitudinal section through the equipment.

The blowers are driven by 3-hp. motors mounted inside the housings. These are designed for opera-

Westinghouse ventilated type 50-cu.ft. compressors. The complete air-brake equipment is Westinghouse 14-EL type. One 10-in. x 10-in. brake cylinder is provided per truck, making four cylinders in all. These are mounted on opposite sides of each sub-frame and are connected to their respective trucks by a single lever and short pull rod, arranged so as to allow the trucks to assume their proper positions on a curve. Hose connections between the air pipes on the main frame and those on the sub-frames, including the brake cylinder pipes, allow the necessary movement. Check valves are arranged so as automatically to cut off the air to any given cylinder in the event of a ruptured hose at that cylinder, thus insuring operation of the three other cylinders.

When it became apparent that increased freight business made it very desirable to handle longer trains, substation capacity was found to be a limiting factor. On the main division out of St. Louis, between Granite City and Staunton, Ill., 300-kw. stations spaced 10 miles apart were in service. Seven additional stations of 1,000-kw. capacity each were added on this division, making the spacing between stations 5 miles instead of 10.

Track Reconstruction Speeded Up by Using Mechanical Ties

Dayton City Railway's Standard Method of Construction Includes a Longitudinal Support Under Each Rail—Concrete Foundation and Paving Is Poured in One Operation

By T. E. HOWELL

General Manager the City Railway, Dayton, Ohio

FOUR miles of equivalent single track was recently rebuilt on West Fifth Street, Dayton, in what is considered to be a remarkably short time. The method of construction which the City Railway used on this job is the standard which has been in use by this company for several years. The plan is extremely simple and it seems to distribute the strength of the track foundation so as to support adequately those points where the greatest strength is needed and to save construction cost where such strength is superfluous.

The rail used is Lorain 7-in. high T, and 8-hole fish-plates are arc welded to the base of the rail. The base of the rail at the joint is welded to the top plate of the joint tie. The pavement is brick upon a 6-in. concrete base with a 1-in. sand cushion between the brick and the concrete. The total excavation for the pavement is 11 in., of which 4 in. is for brick, 1 in. for sand cushion and 6 in. for concrete foundation.

In the older type of construction of wood ties on 8 in. of gravel ballast which was formerly used, the excavation required was 7 in. for the rail, 6 in. for the ties, 8 in. for the ballast beneath the ties; a total of 21 in. in depth or 10 in. below the paving excavation. This required about 315 cu.yd. of excavation per 1,000 ft. of track. By digging a trench 5 in. deep and 18 in. wide under each rail and using Dayton mechanical ties with a cushion feature to protect the concrete, an efficient track foundation is secured with the use of 46 cu.yd. of excavation and concrete, as compared with the much larger quantity required by the former method. A cross-section of this roadbed and the tie spacing are shown in accompanying drawings.

The operation of placing the ties is very rapid. The rails are blocked up on sections of the old wood ties. The foreman marks the rails to guide the men in spacing the ties, and every fifth tie is then hung to the rails and the latter brought to the correct gage at these points. The intermediate ties are then hung to the rails with great rapidity. The work of pouring the concrete is done in the same operation with the pouring of the concrete for the paving foundation.



This Track Built with Dayton Mechanical Ties Has Stood Up Well Under Heavy Traffic for Seven Years

To do this work with the least possible delay to traffic, the 2 miles of double track was divided into six sections. When the steam shovel completed the excavation of one section, it moved to a section at the other end of the opposite track. Thus it was possible to continue the trackwork and the movement of cars without serious interruption while concrete was setting.

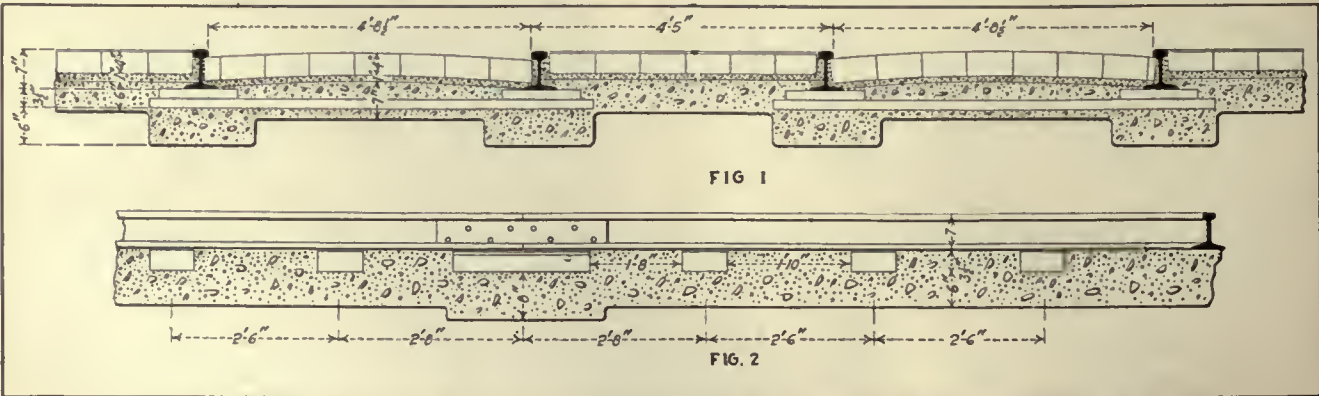
The first construction of this type has been in use by the City Railway since 1917, under the very heavy traffic. Both the Fifth Street and Kammer Avenue divisions operate 20-ton double-truck cars on a 5 to 7-minute headway. Track and pavement are still in good condition as shown above.

Weekly Bulletin from General Manager Goes to Every Beaver Valley Employee

WITH the object of instilling the idea of courtesy in the minds of all the trainmen, the general manager of the Beaver Valley Traction Company, New Brighton, Pa., sends out a weekly bulletin. This practice was begun last spring and was continued for 15 weeks. Then after an interval a second series was started on Oct. 3.

These bulletins are sent to all employees through the United States mail on Friday of each week. The names of many local people, such as the secretaries of chambers of commerce and managers of industrial plants, are included on the mailing list.

A favorable reaction from the bulletins has been noted. There is no unit by which this can be measured except that the managers of industrial plants think that the effort to inspire ideals among the employees is a good one. Neither can the absorption of an idea be measured, but at some time in the future life of the



The Standard Track Structure of the Dayton City Railway Has a Longitudinal Support Under Each Rail

individual the increased mental activity produces results. It is the intention to continue these bulletins for several weeks more and then to have a two or three-month intermission. Some other project will be under way prior to the cessation of the bulletins to take the place of and augment the previous endeavors.

Among the interesting items contained in these bulletins are the following:

When in doubt, lead a trump. This refers to business as well as to cards.

Words are like cards—and the kind words are trumps. You might have a dispute on your car and be in doubt as to how you are going to get out of it. Lead a trump (a kind word) and, nine times out of ten, you will take the trick.

Diplomacy is a habit, but it requires thought. The only difference between the blunderer and the diplomat is that the latter thinks.

When your wife asks you, "Who is the prettiest woman on the dance floor?" be a diplomat and don't rubber around the room.

4 THOUGHT

It's easy 2 C, but hard 2 4 C.
But that is no reason why we should not try to foresee.

Increasing the Speed of Car Loading at Terminals

Studies Made by Detroit Department of Street Railways Indicate Waste of Time in Boarding and Point Way to Modification of Car Entrances

BY H. S. WILLIAMS

Assistant Superintendent of Equipment,
Department of Street Railways, Detroit

IN THE handling of traffic in cities, one of the prime factors in car design is the speed with which the car may be loaded. If the loading feature is properly cared for, this automatically takes care of unloading, as unloading is rarely complicated with fare collection. There are many factors entering into this problem, such as height and width of steps, size of loading platform and system of fare collection.

In Detroit we have several types of cars in operation and varying loading practice. In standard car types, we have the prepayment car with 32 sq.ft. of loading platform available. On this loading platform is an exit door which is often utilized as an extra entrance door near the starting terminal of the line. The standard trail car is center entrance and has but 8 sq.ft. available for loading space, though on this type of car the front exit door is also made use of for entrance near terminals and heavy loading points. Then there is the Peter Witt type car with large double-entrance doors and the front half of the car available as a loading platform, and finally the one-man single-truck car with but one door for both entrance and exit.

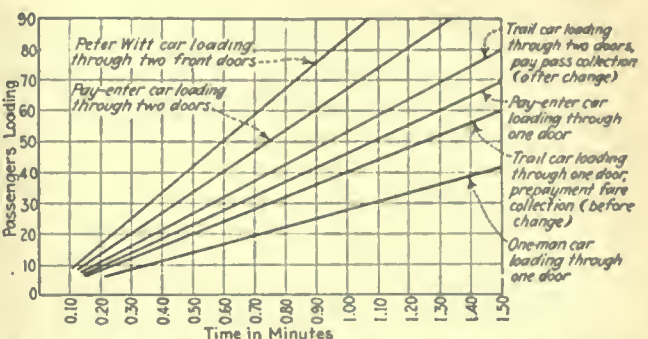


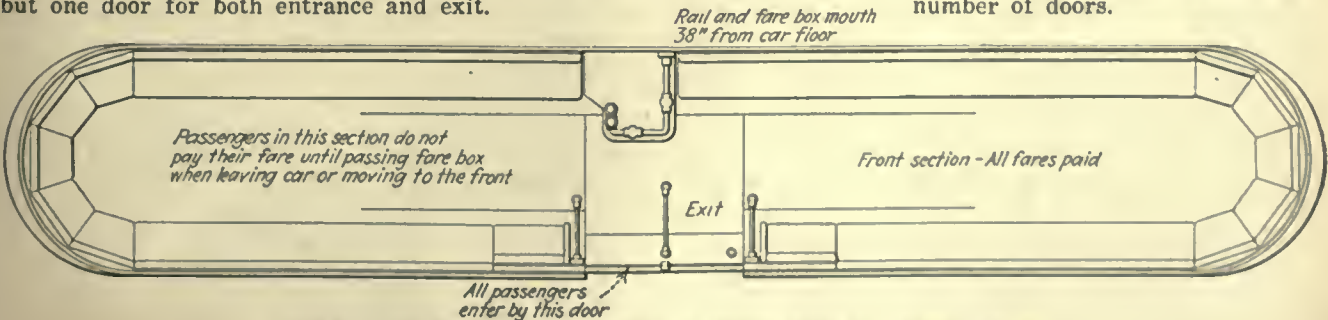
Chart Showing Time Taken for Loading Different Types of Cars

While there is an apparent difference in the loading efficiency of these various types of car the exact relation was unknown, and in order to establish this ratio a large number of time studies were made and the results plotted. From these plotted points lines were drawn, as shown in the graph presented herewith. In these studies the boarding time only was taken, as the principal factor being studied was loading speed in the congested areas with a view to improving this condition. The time consumed in opening and closing of doors was disregarded, as that element is a problem by itself. Observations were made also with small numbers of boarding passengers for the purpose of plotting a curve and establishing a ratio of the loading efficiency of the various types of car, as this factor would naturally have an effect on future car design.

Following this investigation, steps were taken to improve existing conditions on the trail cars and one-man cars. A few trail cars were changed so as to permit free entrance to the rear half of the car, as shown in the accompanying diagram. Passengers in this type of car pay their fares when they pass to the paid section of the car. This car has not been in service long enough to secure the full benefit of this arrangement, as the riders are not fully accustomed to it and there is still some confusion. However, the result has been to speed up loading. The comparative efficiencies of the old and new systems are shown above.

On the one-man cars another door was added at the front of the car, making an entrance and an exit door. This change has, of course, decreased the total time for loading and unloading by about 40 per cent, though the loading time considered by itself has not improved, as this depends upon the size of the loading space in the vestibule and the fare collection system.

There is still much to be done along this line of investigation to develop the highest degree of loading efficiency for city service. The height of step riser, which influences the angle at which the passenger climbs into the car, has an important bearing, as do also widths of doors, position of grab handles and number of doors.



Plan of Trailer Showing Changes Made to Increase Speed of Loading, Detroit

Upper Deck Inclosed for Winter

Removable Top for the Upper Deck of Milwaukee Buses Has Sliding Glass Windows—Roof Is Without Carlines Over the Aisle

By J. H. LUCAS

Superintendent of Rolling Stock the Milwaukee Electric Railway & Light Company

A LIGHT-WEIGHT top has been designed by the Milwaukee Electric Railway & Light Company to inclose the upper deck on its Yellow Coach, model "Z" buses. This is so arranged that it can be easily put on in the fall and removed in the spring. A fully inclosed, removable top was preferred to semi-inclosed construction, because of the added protection afforded the passengers in the winter. The removable feature gives the passengers during the summer a chance to enjoy the warm air and view.

The upper-deck inclosure is tapered from the hand rails to the roof in order to minimize the danger of striking bridge braces, as well as to reduce the bulky appearance which straight sides would have produced. As these vehicles must operate under bridges having only 14 ft. 2 in. clearance, it was thought advisable to make the total height of the bus 14 ft., thus providing a clearance of 2 in. The height from the street level to the upper-deck floor is approximately 8 ft. 7 in. This limited the height from the top of the upper-deck floor to the under side of the roof to 5 ft. 4½ in. Framing of the top is of ash and the roof is ¾-in. Haskelite formed to shape and covered with canvas. No carlines are employed above the aisle, the roof being supported with cantilever carlines fastened to the letterboard at the sides, and tenoned into a ¾-in. wood stringer at the aisle ends. Five aluminum stanchions support the aisle stringers and roof. The carlines are so located that it is unnecessary for pas-



To Protect Passengers in Winter This Bus of T. M. E. R. & L. Co. Has Been Equipped with a Removable Top

steel hand rail of the bus, to which it is secured by bolts. Screening below the upper-deck hand rail was removed and replaced by permanent aluminum sheeting. Although no effort is made to heat this upper deck, it is more comfortable in the winter than is the uninclosed upper deck and serves to take care of the overflow in rush hours.

Billboard Advertising Changed Monthly*

ON ACCOUNT of the fact that steam railroad service is available to many of the patrons of the San Francisco-Sacramento Railroad, it has been necessary for this company to go more extensively into the matter of advertising than would ordinarily be the case. A large volume of passenger traffic between the cities of San Francisco and Sacramento has been built up during the last few years. The management believes that the use of billboard advertising has been instrumental in accomplishing this result.

The billboards are 10 ft. high and 25 ft. long.



Joint Railway and Bus Service Is Advertised on This Billboard. The San Francisco-Sacramento Railroad Believes that Much Traffic Has Been Secured by Billboard Advertising of This Type

sengers to pass under them in getting into or out of the seats.

Upper-deck side sash were necessarily made to slide horizontally. To keep the vehicle as light as possible, they were glazed with single-strength glass. Advertising racks are placed above the windows. Eight electric lamps of 21 cp. provide the necessary lighting for the upper deck. A small vestibule with a swinging door opens into the aisle at the head of the stairs.

In building and mounting the top, the original construction of the upper deck was retained. The new part was built complete and mounted directly upon the

Hand-painted subjects are changed every month. Two of these are shown in accompanying illustrations. One is an advertisement describing the joint service from San Francisco to Lake Tahoe. This is a trip of slightly more than 200 miles, 93 of which is accomplished by rail and the remaining 111 miles by stage. Pierce-Arrow buses are used in this service. The second calls the attention to the state fair at Sacramento. The subject matter is presented so as readily to draw attention and is a high grade example of poster work.

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

Association News & Discussions

Indiana Men Discuss Publicity

THE annual convention of the Indiana Public Utility Association, held in Indianapolis Jan. 22, was the largest ever held by the organization and was marked by the attendance of a large number of women employees.

"Uses of Advertising" was the subject of an address by W. H. Hodge, president of the Public Utility Advertising Association and in charge of advertising for the H. M. Bylesby Company of Chicago. He urged more advertising and more efficient advertising for adequate results. "The quality of utility advertising constantly is being improved," said Mr. Hodge. "No one can defend advertising that is not efficient. While we have no accurate records for 1924, it is estimated that utilities spent between \$11,000,000 and \$20,000,000 last year for advertising. Our own company will spend \$326,000 this year for advertising. Seventy-three per cent of our advertising budget will go to newspapers. This medium must continue to be most important with us. We cannot compare our advertising with that of department stores, where the turnover averages five times annually. We turn our capital stock only about once every 5 years. We should, however, spend about 1 per cent of our gross. We have many things to tell the public.

"One thing we can tell it is of our service, and how it is to be used. Others are our merchandise appliances, securities, relation to community development, achievements during the past year, plans for the next, our rate schedules and our side of controversies. Our advertising should produce peace between the public and the utilities. It will cut the cost of marketing our securities 50 per cent. In one instance four displays and two letters, covering a 30-day period, brought our own company more than 2,000 inquiries."

W. S. Vivian of the Midwest Utilities Company of Chicago, in a talk on "Public Relations," said that 90 per cent of the world's troubles were due to misunderstandings. "We need to educate the public and our employees. Our employees should be able to buy our securities a little easier than the general public. We should encourage our employees to take part in civic affairs and be able to make talks on utilities when given the opportunity."

A bill now before the Legislature seeking to bring under the jurisdiction of the Indiana Public Service Commission all public utility holding companies was vigorously denounced by Gen. George H. Harries, vice-president of the H. M. Bylesby Company, speaking at the annual banquet. "The proposition is so involved that its enactment into a statute would make it impossible for utilities to borrow money to continue their business," he said. "The

utilities would stagnate." He declared that the day of the small utility company is passing. He asserted that it is necessary for efficient and economical operation to maintain group management and control.

C. L. Henry, president Indianapolis & Cincinnati Traction Company, was re-elected president of the association. Other officers elected were S. E. Mulholland, Fort Wayne, and F. J. Haas, Evansville, vice-presidents; Frank C. Jordan, Indianapolis, treasurer; M. V. Robb, Indianapolis, secretary.

Central Accountants' Association

THE Central Electric Railway Accountants' Association will meet at the Claypool Hotel, Indianapolis, on Feb. 27. Following the meeting of the executive committee J. R. Cavanagh, superintendent of car service "Big Four" Railroad, will deliver a talk on "Car Service and per Diem," and C. E. Baker, auditor of Lima-Toledo Railroad, will talk on "Routine of Tracing Claims for Misloaded Freight to Ascertain the Party at Fault." In the afternoon there will be two general discussions, one on "The Advisability of Including Draft Authorities on Interline Statements" and another on "Progress Made in Operation of Buses in Connection with Electric Railways, as to Costs, Service, Depreciation and Tire Renewals." Dinner will be served at the Indianapolis Athletic Club, the evening closing with a theater party. On Saturday, Feb. 29, E. F. Eicks, auditor Fort Wayne, Van Wert & Lima Traction Company, will address the meeting on "Settlement of Interline Balances by Draft." A general talk on pepping up the association will be followed by the address of President Van Bibber, auditor of the Columbus, Newark & Zanesville Electric Railway.

American Association News

A.E.R.A. Headquarters to Move Feb. 21

THE date for moving the headquarters of the American Electric Railway Association to the Johns-Manville Building, Madison Avenue and 41st Street, New York City, from its present location at 8 West 40th Street, has been advanced to Feb. 21. As announced in this paper, the new offices will occupy the entire 14th floor of the building. There will be some 40 per cent more floor space than at the present location, and this is expected to relieve the present crowded condition.

Equipment

A MEETING of the committee on equipment of the Engineering Association was held at association headquarters, New York, Jan. 15 and 16. Those present were Pierre V. C. See, chairman; A. T. Clark, vice-chairman; Daniel Durie, sponsor; C. W. Squier, secretary; Walter S. Adams, W. W. Brown, R. S. Bull, J. L. Gould, J. M. Hipple, W. H. McAloney, A. D. McWhorter, J. F. Miller, E. D. Priest, Ralston B. Smyth, W. G. Stuck, H. S. Sweet, H. S. Williams, and V. D. Bethge representing Joseph C. McCune.

Sub-committees were appointed for the seven subjects which are being studied by this year's equipment committee. The chairmen and vice-chairmen of these committees are: No. 1, review of existing standards, C. W. Squier, chairman; H. S. Sweet, vice-chairman. No. 2, study of brake design, Joseph C. McCune, chairman; J. M. Yount, vice-chairman. No. 3, methods of car painting, R. S. Bull, chairman; W. G. Stuck, vice-chairman. No. 4, motor coach design, A. T. Clark, chairman; J. H. Lucas, vice-chairman. No. 5, devices for trolley contact, W. G. Stuck, chairman; A. D. McWhorter, vice-chairman. No. 6, study of gearing, W. W. Brown, chairman; Ralston B. Smyth, vice-chairman. No. 7, methods of reducing noise, H. S. Williams, chairman; M. O'Brien, vice-chairman. Tentative dates for future meetings of the equipment committee were set. The second meeting will be held at Cleveland March 16 and 17, and the third and final meeting of the committee at association headquarters, New York, May 21 and 22.

The various subjects assigned to the equipment committee for study and report this year were discussed and a procedure was outlined for handling. It was decided that among the standards which required revision were wheel mounting and chuck gages, journal bearing and wedge gages, tolerances for the bore of gears, clearances for armature bearings and the specifications for proof testing of forgings.

Representatives of the motor coach division of the Society of Automotive Engineers were present, and it was decided that this year's work should be devoted primarily to outlining ruling dimensions and nomenclature for bus body construction. The motor coach division of the S.A.E. is to make a study of information obtained by last year's special committee and have representatives present at the next meeting of the equipment committee, so that definite recommendations can be made.

Questionnaires are to be sent out in connection with subjects Nos. 1, 3, and 6 and a definite effort will be made to get a full reply from member companies.

Maintenance of Equipment

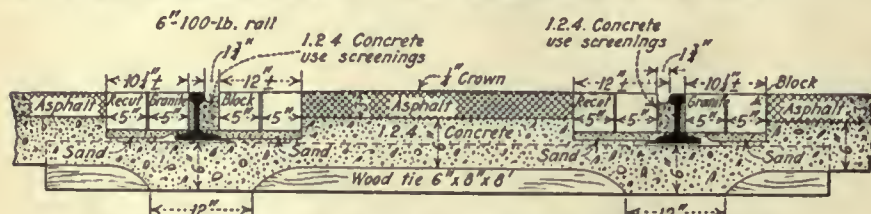
Low-Crowned Pavement

WHEREVER paving has to be laid between rails, the Connecticut Company is now laying as flat a surface as can be provided and yet shed water. The purpose of this type of construction is to make passage over the track easy for automobiles.

Most of the track of the Connecticut Company, even in large cities, is laid with plain girder or T-rail, the present standards for this rail being A.E.R.A. 5-in. 80-lb. A.S.C.E. and the 6-in. 100-lb. A.R.A. type A. This rail is laid on wooden ties with tilted

adapted to a 5-in. 80-lb. rail, although this construction is not recommended for standard practice.

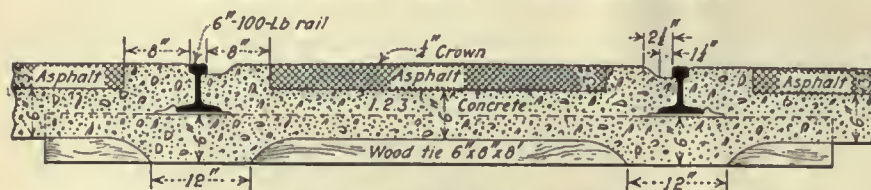
In this type of track construction with the granite blocks laid on each side of the rail, the blocks are usually recut to the size shown and rest on a sand and cement cushion. Space between the inside of the rail and the nearest block is filled with a rich mix of fine aggregate, tamped in, and a groove $1\frac{1}{4}$ in. wide is provided to take care of the wheel flange. Grouting is used with the granite blocks, and the surface between the rails up to the granite block is laid with asphalt with a $\frac{1}{4}$ -in. crown.



Connecticut Company Standard with Granite Blocks Against Rail



Connecticut Company Standard in Monolithic Concrete



Connecticut Company Standard in Concrete with Part Asphalt Paving

tie plates and seam-welded joints, as described in the issue of this paper for April 5, 1924, page 537. When the track is laid in paved streets on a good sand or gravel soil, no ballast is used under the ties. The sub-base is simply rolled before the track is laid. When the sub-soil has poor drainage properties, 6 in. of ballast is placed under the ties, and tile drains are installed, if necessary.

The accompanying drawings show the three standard types of track construction of the company.

The first is used extensively in the city of New Haven. The rail illustrated is a 6-in. 100-lb. section, but the construction shown can be

The second section shows a monolithic concrete pavement and substructure. In this construction the groove on the inside of the rail for the wheel flange is made by a molding strip, which is pounded down flush with the head of the rail, just after the concrete has been poured. This construction is equally well adapted to 6-in. 100-lb. T-rail.

The third section is very similar to the second, except that asphalt is laid between the rails up to a distance of 8 in. on each side of the rail.

In general, the choice of these different constructions depends on the preference of the city engineer. The

first has the advantage from the railway standpoint that joints can more easily be repaired. In no construction is the asphalt carried up to the rail.

The standard rail joint of the company, except in special work, is made with 20-in. machined bars, seam-welded to the rail, as described in the issue of April 5, already mentioned. Seam-welding is also used between the base of the rail and the joint base plates. The company has also recently been using thermit for some of its T-rail construction in paved streets, about 200 thermit joints having been laid during the past summer in New Haven.

In special work, bolted joints are used with rails spiked directly to ties.

Careful Grinding Prolongs Life of Drills

ONE of the important machines that permit the mechanical department of the Altoona & Logan Valley Electric Railway, Altoona, Pa., to operate efficiently is a Grand Rap-



Drill Grinder in Altoona Shop Has Proved a Good Investment

ids drill grinder. Experience has shown that the use of this machine not only prolongs the life of the drills by making them more accurate and equalizing the strain in the metal, but also enables the shop men to drill better holes.

Installing Resistors Inside Cars

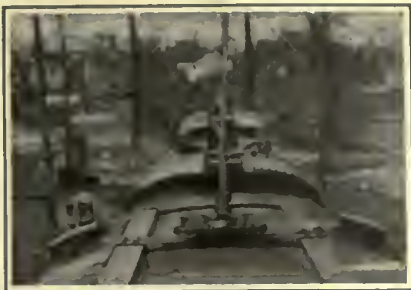
DURING the winter and spring months, the Northern States Power Company, Fargo, N. D., experienced considerable trouble from short circuits caused by melting snow and water on the tracks, burning off lead wires at resistors. As the space for installation of resistors on safety cars was quite limited, the company tried removing these from beneath the floor and placing them inside the car at one end just back of the operator. A partition 3 ft. high was placed ahead of the front seat to protect the operator and passengers from draft, and this also acts as a shield to prevent passengers from coming in contact with the resistors, either while seated or standing near this point.

The resistors are insulated with $\frac{1}{4}$ -in. asbestos lumber, and the tops are protected by a metal cover made in the shape of an inverted V. Twenty-four 1-in. holes are punched in the cover to allow the heat to escape freely. A fine screen is soldered to the underside of these holes, which prevents the entrance of particles which might damage the resistors. The angle-iron framework and cover were painted black. A red lettered sign reads "Danger—550 volts."

As thermostatic control is provided for the electric car heaters this method of installing the resistors inside has materially reduced the energy used. The cost for making the change was not excessive, and pull-ins from burnt-off wires have been done away with entirely.

Divided Trolley Board Gives Better Clearance

SOME time ago the Altoona & Logan Valley Electric Railway, Altoona, Pa., acquired a number of nearly new cars which had formerly belonged to another railway operated under the same management. These cars were somewhat higher than the standard cars used in Altoona, and it was found that there was considerable difficulty on account of low clearance under bridges. To increase the clearance the trolley board was divided into two strips 4 ft. apart. Flat steel bars between these strips support the trolley base. The latter is the flattest type which is now on the market. The combination of these methods of reducing the over-



Trolley Base Is Supported on Flat Steel Bars Between Wood Strips 4 Ft. Apart

all height has resulted in giving sufficient clearance and these cars are now operated without difficulty in Altoona.

Overhauling Car Cables

APPROXIMATELY 25 per cent of the cars overhauled at the Wolf Street shop of the New York State Railways in Syracuse have required new cables. In replacing these, No. 4 rubber-covered, double-braided seven-strand wire has been

substituted for the No. 6 size previously used. Two coverings of canvas hose are also used instead of a single one. After applying, the canvas is given three coats of black insulating paint. This is allowed to dry for 24 hours, and the cable is then taped its entire length with 2-in. friction tape. After taping, another coat of insulating paint is applied.

In wiring with this cable, it is cleated to the two center sills running the length of the car. This brings it parallel with the leads as they come from the motor. Particular care is taken not to cleat the cable to the floor, as some trouble has been experienced, due to screws from the floor slats entering the sheath and causing damage. Knuckle-joint connectors are used on all motor leads. These are covered with $\frac{1}{4}$ -in. rubber tubing and are fastened to the main sill with wooden cleats.

New Equipment Available

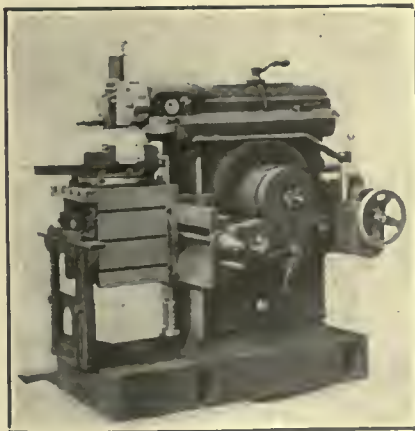
Back-Geared Shapers

A HEAVY-DUTY 16-in. shaper, driven by a single pulley through a selective type back gear arrangement has recently been brought out by the Stockbridge Machine Company, Worcester, Mass. The geared drive with a high ratio gearing gives ample power for heavy roughing cuts. The gear arrangement is of the selective sliding-gear type, with a shift similar to that used in automobile practice. There are four changes of speed in the gear box. With back gears this gives eight speeds in all. The gears are of

heat-treated steel, and can be run in oil or light grease. The teeth are pointed to permit of easy shifting.

An automobile-type driving clutch is used for starting and stopping the machine. When stopped, it locks the shaper against any possibility of starting. The clutch is operated by the horizontal lever which is extended from the front of the machine within easy reach of the operator. The ram can be positioned by moving the same lever back and forth. A handwheel is provided on the side of the machine for setting the ram by hand. It is unnecessary to stop the machine to change the speed. The feed always operates on the return of the ram and never feeds on the cut, which eliminates danger of breakage.

The base of the shaper has been made unusually deep in order to provide for deep ribs and give extreme rigidity. This deep base carries a table support for the knee. The vise is constructed to eliminate overhang of the front jaw. It is also designed to keep the work close to the top of the table. The body of the vise stands up but $4\frac{1}{2}$ in. from the top of the table. The vise jaws are 12 in. x $2\frac{1}{2}$ in., and they open 12 in. The machine can be furnished with automatic down-feed.



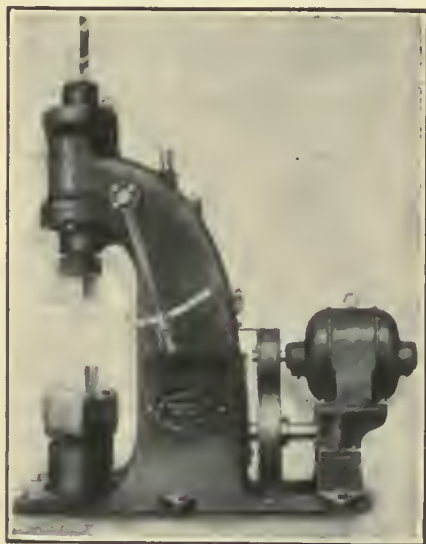
A Heavy-Duty Back-Geared Shaper with Eight Speeds

Improved Nickelchrome Wire for Heaters

AN improved form of nickelchrome wire is being marketed under the trade name of Kerma by the Electrical Alloy Company, Morristown, N. J. This wire is made particularly for extremely high and continuous temperatures, and is recommended especially for electric heating elements of car heaters. It is said to be free from oxides and has no weak spots in the structure which would cause breakage.

Six Small Sizes of Air Hammers

ANEW line of upright air hammers is being marketed by the Beaudry Company, Inc., Everett, Mass. These tools are furnished with rams weighing from 100 to 1,200 lb. Particular attention has been given in the design of the frame to provide for resistance to shock



Motor-Driven Air Hammer

and jar of the blow. Anvils are separate, and are supported on their own foundation. This eliminates shock to the hammer frame. The hammer is provided with both tight and loose pulleys, so that when belt drive is used no countershaft is necessary. The machines are also arranged for motor mounting with individual drive. The blow can be regulated by either treadle or hand lever.

The form of the ram is such that the greater part of the weight is concentrated in a bar of large diameter. This allows a large amount of room for handling, due to its being guided by passing through both the upper and lower cylinder heads. The

head is entirely separate from the bar, and is readily removable. It is held securely to the ram by wedge clamping rings. The cushioning of the ram is done entirely by air, avoiding springs or rubber cushions.

The compressor piston is inclosed in the hammer frame and is mounted in a vertical position. The reciprocating movement of the piston is obtained by a crank on the end of the motor-driving shaft. In ascending the piston compresses air for operation which flows into the ram cylinder, sending the ram upward with great speed. When near the top air is trapped so as to form a cushion and cause the ram to rebound. The force of rebounding combined with the suction of the compressor piston gives the energy for striking a heavy blow.

Portable Arc-Welding Set

APORTABLE motor-generator type of arc-welding machine has been added to the line of Wilson Welder & Metal Company, Inc., Hoboken, N. J. The set is particularly useful for light welding work in railway repair shops. It has a range of adjustments from 75 amp. to 250 amp. in small steps and is intended for rapid work using electrodes up to $\frac{1}{4}$ in. diameter. The generator is of the field-control type, with current regulations such that when welding at full load the current does not rise above 10 per cent of the short circuit value. As ballast resistors are not used and as the windings are of low resistance, the voltage generated is practically that of the arc plus the drop in the welding leads. The machine is mounted on a base of channels welded together, and is equipped with roller-bearing steel wheels. It is 52 in. long, 40 in. high, 30 in. wide and weighs 1,260 lb.

Roller Bearings for Line Shaft Hangers

THE Dodge Manufacturing Corporation, Mishawaka, Ind., has placed on the market a line-shaft bearing embodying the Timken tapered roller bearing, as well as several new features of construction. This line-shaft bearing consists of five parts. Two tapered roller bearings are mounted on a steel tube, ground and slotted and fitted to an accurately machined housing. The ends of the steel tube are threaded to receive clamping collars. The mounting of the tapered roller bearing in-

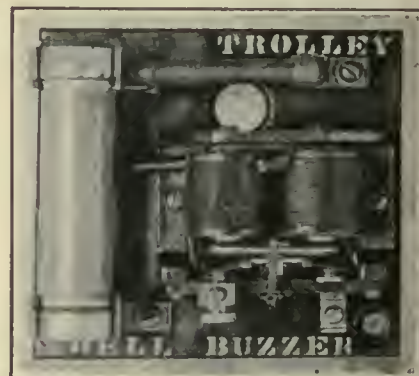
sure full utilization for both radial and thrust loads. The sleeve on which the bearings are mounted extends from end to end of the housing and liberal grease compartments are provided inside the housing and outside the tube. The outer ends of the bearings are protected against dust by special metallic grease seals which eliminate friction and prevent dust from working in or the lubricants from working out. The grease seals take the place of felt washers or packing.

The erection of the line-shaft bearing is accomplished by slipping the bearing over the shaft and setting up the clamping screw in each of the clamping collars. To remove it in order to make any necessary repairs the screws in the collars are loosened and the bearings can then be slipped off the shaft.

Interrupter Unit for Buzzers

AN IMPROVED design of interrupter for use on 600-volt circuits with buzzers has been brought out by the Consolidated Car Heating Company, Albany, N. Y. The two coils of the interrupter are in series and the hinged armature has a nichrome contact strip. In order to provide flexibility the contact strip is not rigidly connected to the armature, avoiding binding that might prevent proper contact. The two stationary contacts are adjustable and both have tungsten points.

A glazed type of resistance is



An Interrupter Unit for Buzzer Circuits with Flexible Contact Strip

mounted together with a fuse in the same case as the interrupter unit. This case is of sheet steel about 6 in. square. The same fuse and resistance are used for single stroke bells by taking a tap off ahead of the interrupter after passing through the resistance. Separate terminals are provided for buzzers and bells.

The News of the Industry

Wages Remain Same

Detroit Municipal Employees Will Not Press Demands for Higher Wage—Former Status Restored

The appeal to the courts in the case of the increased wage demand of the street railway employees in Detroit, made through the union, has been abandoned and conditions restored to exactly the same status that existed before the demand for more pay was made, or the same status held since the establishment of the Detroit Municipal Railway during the administration of James Couzens as Mayor. It has been announced that although the union platform employees of the D. S. R. won their demand that Judge Richter's decision last June stand in its entirety, the men will not press their wage demands at the present time. Judge Richter's ruling ordered the Street Railway Commission to arbitrate with the men through their representatives. The commission will withdraw its appeal pending before the Michigan Supreme Court, which was made following Judge Richter's decision that the commission was bound to arbitrate wages and working conditions.

The men agreed to withdraw their demands for increased wages and arbitration, acting at the request of Mayor John W. Smith. The commission believed that the men were fully and completely protected under the city charter. On the other hand, a majority of the men persisted that their relations with the city must be handled through their union officials, and the difference of opinion led to the appeal to the courts. The commission had insisted, up to the time of the conference with Mayor Smith, that as a precedent to withdrawing the appeal the men seek an order vacating Judge Richter's decision. With the withdrawal of the men's demands it was considered that there was no present case for Judge Richter's decision to operate upon.

A resolution adopted by the commission on Feb. 7, 1923, outlined wages and working conditions and provided for arbitration of disputes. This resolution, rescinded last year, is again reinstated without the amendments which constituted the new demands made by the men last April. It is cited that the resolution does not bear the signatures of the union officials and therefore is not a signed contract.

It is considered that Judge Richter's decision binds the commission to arbitrate with any association of the men, including the D. S. R. Trainmen's Association, in which non-union platform employees are members. Although these constitute a minority, according to the commission, that body has always been willing to arbitrate with the men through this association.

The section of the resolution of Feb. 7 which caused the dispute provides

that in all cases of grievances or disputes the employees shall be permitted to be represented in hearings before the officer or officers or commissioners of the street railway department by the representatives of the said employees chosen by the associated em-

ployees. In case of failure of adjustment of said case, or cases, by or through said hearings, said employees may have such recourse as is provided in Section 19 of the street railway chapter of the charter, providing for arbitration of disputes.

Georgia Interurban Suspension Lifted

Marietta Line Resumes Operation Following Banning of Jitneys and Denial of Receivership Suit—Atlanta Jitney Status Acute—Anti-Jitney Ordinance Passed in East Lake

SERVICE was resumed on the 16-mile line of the Atlanta Northern Railway between Atlanta and Marietta, Ga., on Jan. 24, following a suspension of 10 days. The portion of the track which was torn up when the road ceased operating was repaired and cars began operating on the old schedules. Decision to resume the service came after the city of Marietta had passed an ordinance banning jitneys and buses from competing with the railway and after a plea by Judge Morris of Marietta to throw the road into receivership had been denied by the Fulton Superior Court.

Judge Morris insisted that the Atlanta Northern Railway, having suspended its service to Marietta on Jan. 14 by removing its cars and tearing up a section of the track, should surrender its charter. He contended that the company had violated the state law in suspending service without permission from the State Public Service Commission and asked that the court appoint a receiver to operate the line. The Atlanta Northern Railway, however, contended that it could not be compelled to operate at a financial loss. Its defense was that since the establishment of the line in 1905 its revenues had been insufficient to pay operating expenses, must less dividends. It also contended that as Judge Morris was not a stockholder in the company he had no right to bring suit to compel a receivership.

Since then a "fast" bill of exceptions, appealing to the State Supreme Court from the ruling of Judge W. D. Ellis, which denied pleas of Judge Newt A. Morris for injunction and receivership against the Atlanta Northern Railway, was signed by Judge Ellis. Such a bill gives the appeal the right of way in the Supreme Court, it is pointed out, and calls for an early hearing. Judge Morris contends that if the Supreme Court sustains his contentions it will be to grant an injunction forbidding the railway from tearing up its tracks or discontinuing service in the future without permission from the State Public Service Commission.

Hearings on the petition began Jan. 19 and as soon as the decision of the court was handed down denying the

suit a committee from the Marietta Chamber of Commerce got in touch with officials of the Georgia Railway & Power Company, of which the Atlanta Northern is a subsidiary, and a conference was arranged, at which it was agreed to resume service. Under a special extension of time granted the jitney operators by the Marietta Council they were permitted to operate until Jan. 28, at which time the new anti-jitney law ordinance becomes effective. It is expected that the jitney operators will attempt to secure a permanent injunction restraining the Marietta Council from enforcing its ordinance and permitting them to operate.

The Georgia Railway & Power Company, however, has won its point, namely, the exclusion of jitney and bus transportation between Atlanta and Marietta and the elimination of what it has termed for months "unfair competition."

Not only in the city of Marietta is the jitney being banned but also in Atlanta itself. An ordinance was recently introduced before the City Council there abolishing jitneys from the city streets. The denunciation of the jitney and the demands that it be banned featured the first hearing on the question held at the City Hall on Jan. 23. The meeting was called to order by Alderman J. L. McLendon, chairman of the new traction committee of the City Council. A feature of the meeting was the reading of many resolutions from leading citizens, business, civic and other organizations asking that the ordinance banning jitneys from Atlanta streets be passed.

A counter attack upon the power company was made under the leadership of the president of the Atlanta Jitney Bus Association. Alderman McLendon decided that since public opinion was so strongly in favor of passing the anti-jitney ordinance no more hearings would be held, but that the matter would be taken up directly at the next meeting of the City Council.

The entire elimination of jitneys in Atlanta is expected to follow the banning of them from East Lake, a suburb of Atlanta, on Jan. 21 as a result of the passing of an anti-jitney ordinance by the Town Council.

New Company to Operate Rockford's Railway System

The City Council of Rockford, Ill., has instructed its legal department to draft a new ordinance which will give T. M. Ellis, Jr., head of the newly organized Rockford Public Service Company, a franchise to operate a traction system. Mr. Ellis made a plea for this action and it was supported by a letter from Mayor Herman Hallstrom. The Mayor charged that the effort to secure a new franchise for the Rockford City Traction Company, which now operates the system, was insincere. Mr. Ellis is president and general manager of the Beloit Traction Company and the Kewanee Public Service Company. He has offered to accept the terms drawn up by the City Council and rejected by the Rockford City Traction Company.

The dispute in Rockford between the city and the railway dates back to October, 1922, when the company's franchise expired. At that time a new 20-year franchise was sought. In return for this new franchise the Rockford City Council demanded certain pledges from the company, among them a guarantee for the expenditure of \$750,000, to be spread over a period of 20 years, covering the construction of new lines, new equipment and replacement of considerable old trackage. At first the city insisted on a 10-year franchise, but later agreed to make the franchise continue for 20 years providing all its requirements were met by the company. Mr. Ellis has agreed to accept the franchise drawn up by the city, meet all its terms, equip the system with new rolling stock and machinery, extend the lines into new territory and rehabilitate the entire property. Immediate improvement plans call for the purchase of 25 buses to be used as feeders to the railway system. He further agreed to buy the complete equipment owned by the Rockford company at a price to be fixed by appraisers. He offered to furnish a guarantee of \$750,000 demanded by the Council for improvements to be made within a certain specified time.

\$105,000,000 Plan for Chicago's Traction System

Convinced that Chicago's proposed "half billion dollar transportation system" will be kept from fruition by the cries of rival politicians, Henry A. Blair, president of the Chicago Surface Lines, has made a new traction proposal workable with private capital and dependent on long-term franchises. The plan calls for \$105,000,000 expenditures in 6 years, including the city's \$40,000,000 traction fund for a subway.

The new feature suggested is a 4-mile system of pedestrian subways or sidewalk plazas designed by L. A. Drum, engineer, who laid out the passageway linking the Pennsylvania Station with Herald Square in New York. These would radiate from subway stations to nearly all big stores and stations and would be built at a cost of \$175 to \$250 a front foot to the abutting property.

Other proposals are for a four-track subway in State Street from 19th

Street to Division Street and two two-track subways in east and west boulevards for use of elevated trains and two-car unit surface cars. The plan calls for \$22,000,000 financing by the surface lines and \$44,550,000 by the elevated, the latter's program being one for which Samuel Insull has asked the city for authority to proceed.

Twenty Passengers Hurt in New Jersey Accident

A car of the Public Service Railway bound on Jan. 22 from Passaic to Hoboken through Jersey City jumped from the elevated trestle on First Street and dropped head first to the



International News Reel
Jersey Car After Leaving Trestle

ground, carrying about 40 passengers with it to the street below. The car stood on end, as shown in the illustration, piling the passengers at the bottom. Twenty of the passengers were injured, but none of them seriously.

Increased Rates Necessary

The New York State Railways filed with the Public Service Commission on Jan. 27 a petition for permission to put into effect on short notice an increase in commutation rates on its Rochester & Eastern division and its Sudus Bay division. The present rates have been in effect since Aug. 28, 1920. The proposed rates for commutation service are as follows: On 54-trip commutation ticket books and 46-trip school ticket books the rate of 2 cents per mile for distances of 5 miles or less, to and including 12 miles; 1½ cents per mile for distances beyond 12 miles to and including 24 miles; 1¼ cents per mile for distances beyond 24 miles to and including 43 miles, a fraction of a mile to be counted as a full mile. It is proposed to increase the minimum fare for children from 3 to 5 cents. It is stated in the petition that the commutation earnings on the two divisions for the year ending Oct. 31, 1924, aggregated \$38,697, or 10.99 per cent of the total passenger revenue of the lines. The cost of the commutation service is estimated by the road at approximately \$43,000.

Transportation Plan for Los Angeles Awaited

In a preliminary statement issued by traffic survey engineers of the engineering firm of Kelker, DeLuw & Company of Chicago, Los Angeles by making provision for transit facilities can still keep up the pace of its rapid growth and arrange for the accommodation of 4,000,000 population within an area of 10 miles of Pershing Square. This firm has been engaged during the past year in making transportation surveys for the city of Los Angeles and the county of Los Angeles, the joint survey to cost the two governments \$40,000, with expenses divided in half. The survey was first undertaken on May 1, 1924, and its purpose was to provide a similar transportation system as prepared for Chicago by these engineers.

The Los Angeles report contemplates rapid transit by subway and elevated systems, supplemented by surface cars and buses, to distribute the population throughout the metropolitan district outside of the central urban area.

The statement recommended in part that the suburban rapid transit railroads should be designed to provide high-speed service between the centers of the suburban cities and the central cities. On the urban rapid transit railroads over-all speeds of from 18 to 25 m.p.h. could be maintained. On the interurban rapid transit railroad over-all speeds from 25 to 40 m.p.h. could be maintained.

It is anticipated that the complete transportation report of the engineers will be filed soon.

Want Buses in Massachusetts Under City Control

Both electric railway companies in Massachusetts and their employees have taken a united stand this year in demanding of the Massachusetts Legislature that a law be enacted placing the jitneys and buses under the control of the local city and town authorities, and under the Metropolitan District Commission when the use of boulevards is involved. They have a bill which calls for the licensing of motor cars engaging in the passenger business and their regulation as common carriers.

It is the opinion of the railway interests that they can compete with the buses if the two classes of transportation are placed under the same regulations and can compete on comparable bases. The Amalgamated Association is giving wholehearted support to this proposition. It was represented at the Boston conference by 12 union presidents and by John H. Reardon, international vice-president. Among the representatives of railway managements were Fred A. Cummings of the Eastern Massachusetts Street Railway; Edward Dana of the Boston Elevated; Clark V. Wood of the Worcester Consolidated and the Springfield Street Railway; L. D. Pellissier of the Holyoke Street Railway; Clinton Q. Richmond of the Pittsfield Street Railway; Ralph D. Hood of the Massachusetts Northeastern Street Railway, and representatives from the Boston & Worcester and the Middlessex & Boston Street Railways.

Bus Operating Offer Made by Interborough, New York

Frank Hedley, president and general manager of the Interborough Rapid Transit Company, New York City, in a letter sent to members of the State Legislature, states that the company is willing to operate 3-cent feeder buses, in conjunction with its existing system, and also to provide 8-cent buses as a rush-hour expedient on streets occupied by rapid transit lines. He said the Interborough was prepared to examine the matter of free transfers from buses to elevated lines and subways.

Mr. Hedley says the establishment of a comprehensive bus system in this city in competition with Interborough subways and elevated lines in which the city of New York has a large financial interest will result in annual losses to those lines of from \$1,000,000 to \$2,000,000.

Mr. Hedley requests the Legislature to defer action on pending application for bus franchises for a period sufficient to permit the Interborough, after conference with the Board of Transportation and experts of the Legislature, to formulate a plan for bus operation for the consideration of the State Legislature.

Fare Increase Impends at Newburgh

The Newburgh Public Service Corporation, Newburgh, N. Y., has filed an application with the Public Service Commission for permission to increase the fares on its lines upon short notice. The corporation claims that the 7-cent fare now in force is insufficient to yield a reasonable compensation for the service rendered and asks the commission to determine reasonable and just charges. The petition includes a copy of the resolution of the Newburgh City Council consenting to an increase from 7 to 10 cents. Transportation service in Newburgh is entirely by bus except for one line operated out to Orange Lake.

Utility Regulation Bills Before Indiana Legislature

Members of the Senate committee of the Indiana Legislature having to do with utility legislation will carry to the floor of the Senate the fight being waged on measures dealing with more stringent regulation of utilities by the Indiana Public Service Commission, according to action taken on Jan. 24 by the committee. Another bill to tighten the regulation of utilities went into the House on Jan. 23. The measure provides that no utility shall place a valuation on its securities or shall assert a valuation for rate-making purposes beyond the assessed value of the property for tax purposes. The committee will recommend for passage the bill which would provide that utility depreciation funds can be used only in replacement of equipment or in new construction and another bill which would provide that utilities under regulation of the commission must agree to appeal rate case decisions to the state Supreme Court before appealing to the federal court.

Further action will be taken by the committee on the bill which would make a utility of all companies or organizations holding more than 50 per cent of the stock of a public utility and bring such holding company under the regulation of the public service commission.

Co-ordination of Service Proposed in Norfolk

The Virginia Railway & Power Company is ready to submit a plan for the operation of buses in Norfolk, Va., in co-ordination with or as an auxiliary of its railway system there. It is understood that the position of the company is:

That the company is willing to begin the operation of buses without additional legislation from the Virginia Assembly.

That the company is willing to reimburse owners of bus routes which it takes over on the appraised value of the equipment by a board of arbitration if the company and the owners were unable to agree.

That buses would be operated that would insure comfort and safety and that trolley-buses be used on several routes.

Bus Legislation Proposed for St. Louis

The public utilities committee of the St. Louis Board of Aldermen has voted to file the bill for the regulation of buses prepared by C. E. Smith, consulting engineer for the city. Mr. Smith will be asked to draft another measure not quite so drastic to provide that the Aldermen and not the Board of Public Service shall issue bus permits. It will fix heavy taxes to be paid by the bus company as compensation to the city. An endeavor will also be made to have buses classed as public utilities and made subject to the regulation of the Missouri Public Service Commission.

Chicago Surface Lines Creates New Division

Organization of a new traffic division covering the downtown district has been effected by the Chicago Surface Lines to work in closer co-operation with the police for swifter movement of traffic. The new division began functioning on Jan. 5 as a contribution to several months of traffic innovations which proved notable successes for street car, pedestrian and vehicular traffic. In all particulars the new division is a crack outfit. It is headed by P. J. Duffy as superintendent, one of the oldest officials on the Surface Lines. Twelve efficient supervisors were assigned to him. The force was presented at police traffic headquarters so that it will function in a friendly spirit with traffic policemen.

Extra Appropriation Approved in Cincinnati

On recommendation of the finance committee the City Council of Cincinnati, Ohio, passed the semi-annual appropriation ordinance which includes an additional allowance of \$20,000 for the solicitor's office. The major portion of the additional appropriation will be used to defray expenses of litigation to obtain forfeiture of the present fran-

chise of the Cincinnati Traction Company, in the event such action becomes necessary. When called upon to explain this additional allotment at the time the appropriation ordinance was drawn, Mayor Carrel said the money was needed to carry out his previously announced intention of bringing suit to forfeit the existing traction franchise.

This announcement came as a climax to the fruitless negotiations over the proposed new traction franchise. It drew the fire of certain members of Council, with the result that the request for the additional funds was referred to the finance committee. Realizing that rejection of the appropriation by Council would defeat his plan to try to forfeit the existing traction franchise, Mayor Carrel and Frank Bowman, newly appointed city solicitor, together with members of the citizens' traction committee, attended the special meeting of the finance committee and urged the committee to act favorably on the appropriation. After the finance committee had acted favorably on the additional appropriation, Council went into special session and passed the ordinance in its entirety.

Utilities Measures Before California Legislature

Considerable activity has developed at Sacramento, Cal., during the recent session of the Legislature. Efforts have been exerted to present a bill to reduce the taxes of public utilities. A constitutional amendment was introduced in the Assembly on Jan. 15 proposing to tax the gross earnings of the publicly owned utilities on the same basis as privately owned utilities are now taxed by the State of California. If approved the measure would place a state tax on the earnings of the San Francisco Municipal Railway and other similar enterprises. A similar measure was passed by a previous Legislature, but was voted down by the people. There is also pending a bill to regulate the size of buses using the public state highways and roads for passenger service.

Jitneys Attached Again in Detroit

The Police Department at Detroit, Mich., has been directed by the City Council to enforce the old ordinance governing the operation of jitneys in the city. This measure requires the jitneys to carry city licenses. The jitneys were operated up to the end of 1924 without licenses. This they did under an injunction from the Circuit Court, issued when the new jitney ordinance was blocked. The Circuit Court's decision was appealed by the city, but it is reported that a decision may not be reached by the Supreme Court for another year.

The old license ordinance was never rescinded and licenses and records under its provisions have been prepared by the Corporation Counsel's office. The Comptroller's office says it has no records of the number of buses operated in the city or of their routes. It has scant information on the matter of the payment of the city tax of 1 cent a mile.

News Notes

Seeks Extension of Bus Service.—The Traction Bus Company, subsidiary of the Johnstown Traction Company, Johnstown, Pa., seeks to extend its bus service to Boswell, a distance of 4 miles. Two buses will be used. A hearing is scheduled Feb. 5.

Buses as Extensions.—The St. Louis Bus Company, subsidiary of the United Railways, St. Louis, Mo., opened its West Florissant Avenue bus lines on Jan. 13. The buses will operate as extensions of the Bellefontaine Street railway line. Transfers will be issued to and from the street cars. The bus fare will be 10 cents with no extra charge for a street car transfer. A street car rider can obtain a bus transfer for the payment of 3 cents in addition to the regular street car fare of 7 cents. The St. Louis Bus Company has been operating a line on Natural Bridge Avenue between the terminus of the Natural Bridge Street car and Pine Lawn.

Will Make Survey.—United States Judge F. E. Kennamer refused on Jan. 22 to discharge John W. Shartel, president of the Oklahoma Railway, as one of the receivers of the company as demanded by the city attorney of Oklahoma City. The court has granted the receivers permission to employ Stone & Webster, Inc., Boston, to make a survey of the conditions surrounding the operation of the railway and to make an expenditure amounting to \$100,000 to improve the roadbeds and service of the company's lines. It is announced that Stone & Webster will be represented in their work for the receivers by George H. Clifford, Fort Worth, manager of the Northern Texas Traction Company, a Stone & Webster property, which last year was awarded the Coffin prize.

Good Will in "Ads."—The Des Moines City Railway, Des Moines, Iowa, is confining a great deal of its advertising space to the building of good will in the rotogravure section of the *Des Moines Register*. One of its recent "ads" was a two-column display devoted to giving directions for finding public places of interest.

Bus Route Sanctioned.—The Public Utilities Commission of the District of Columbia recently authorized the Washington Railway & Electric Company to operate a bus route from Nichols Avenue and Good Hope Road, S. E., to Blue Plains, and to Nichols and Valley Avenues. The commission at the same time ordered that the rate of fare on these buses be the same as the rate of fare on the railway lines or such other fare as may be prescribed by the commission.

More Time and Money Needed.—City Solicitor Gaffney of Philadelphia, Pa., has recommended that funds be provided for further investigation of problems involved in the Philadelphia Rapid Transit Company's fare question. He estimates the cost at \$75,000. In a letter to Mayor Kendrick, which the

Mayor sent to the Council, Mr. Gaffney said that about 4 months more of investigation would be needed. He also expressed the opinion that the company's financial condition this year might be such as to justify a decrease in the present 8-cent rate. Some months ago the commission adjourned hearings on the protest of the city against the increase in fares from four tickets for 25 cents to two tickets for 15 cents. At that time Mr. Gaffney sought a postponement.

Ordinances Pass Second Reading.—An ordinance calling for an agreement between the city and the Philadelphia Rapid Transit Company, Philadelphia, Pa., for the construction of the Chestnut Street subway and an ordinance granting franchises for three bus lines in the populous sections of the city passed second reading in the Council on Jan. 22.

Two Years More Allowed for Construction.—Extension for 2 years of the time within which the Frontier Electric Railway, Buffalo, N. Y., shall start and finish its proposed line between Buffalo and Niagara Falls is sought in a bill introduced into the Legislature by Senator Hickey of Buffalo. Some years ago the Frontier Electric Railway acquired the right-of-way between Buffalo and Niagara Falls. Part of the right-of-way is occupied by the Buffalo-Niagara Falls high-speed division of the International Railway, Buffalo.

Buses at Newport News Taken Over by Railway.—The Newport News & Hampton Railway, Gas & Electric Company has recently taken over passenger bus lines operating over routes in Newport News, Va., in competition with its railway lines. The plan is to replace the bus equipment with newer and more economical motor cars. At this time there are no plans for extending the bus lines to new territory. Practically all of the populous parts of Newport News which are not within a few seconds' walk from a car line already are served by the established routes.

Want Service Restored.—A resolution asking the Detroit United Railway, Detroit, Mich., to take over the defunct Detroit, Bay City & Western Railroad and operate it either as a steam or an electric line was passed at a meeting of farmers and citizens of Snover recently. The resolution states that 85,000 farmers are dependent upon the road for service.

Partial Bus Substitution Reported.—R. L. Lindsey, vice-president and general manager of the Durham Public Service Company, Durham, N. C., has told the city that plans are being made to co-ordinate railway and bus service. The present idea is to abandon a portion of the track in West Durham. The program, stated unofficially, includes the purchase of three buses.

Approves Coupon Ticket Book.—The Public Service Commission has approved a 40-commutation coupon ticket book of the Hudson Valley Railway at \$6.40, good for transportation in either direction between Round Lake and Mechanicsville, N. Y. The book is limited to 30 days.

Will Supply Bus Service.—The Key System Transit Company has applied to the California Railroad Commission for a certificate to operate bus service between Santa Clara Avenue and High Street in the city of Alameda and East Fourteenth and High Streets in the city of Oakland, substituting such service over the proposed route for the present service. It is stated that operation over the present route is being maintained at a loss of \$7,000 a year under present patronage, and the present route is not warranted. The present bus service was established upon authority of the commission in a proceeding involving an application by the Peerless Stages, Inc., to operate stages between Oakland and Alameda, the Key System Transit Company intervening and agreeing to supplement alleged insufficient car service by bus service.

Bus Service as Experiment.—The Key West Electric Company, Key West, Fla., is preparing to start a new bus service. According to the present plans the buses will be put in operation as an experiment for a period of three months.

Extensions of Service Sought.—Representatives of organizations in the outlying districts of Sacramento, Cal., and representatives of the Pacific Gas & Electric Company met at a special session of the City Council to discuss the possibility of obtaining either railway service or a bus line in those sections not now served with transportation. P. M. Downing, in charge of operation of the Pacific Gas & Electric Company, said that his company was ready and willing to do anything possible to give a better service, but that the receipts of the company during the past 2 years had shown a definite loss. He said further that no new car lines or buses could be installed unless the company in some way could show a profit.

Wants Payment Deferred.—Trustees of the Boston Elevated Railway, Boston, Mass., have asked the Legislature to correct the legislation of last year under which the subway extension to Ashmont is being built. That law provides that the Elevated must pay rental on the property as soon as the work of construction begins, so that the Boston Transit Commission is already prepared to send a bill to the Elevated. Col. Thomas F. Sullivan, chairman of the Boston Transit Commission, agrees with the Elevated trustees that the Elevated should not pay rental until the new line is completed and put into operation. He agrees with the counsel for the Elevated that the interest on the cost of extending the line should be reckoned as a part of the cost of construction. But the Elevated is willing to use parts of the extension before the whole is completed.

Buses Ready in April.—Samuel Cox, superintendent of the Quincy Railway, Quincy, Ill., has been notified that buses for the South Eighth and State Streets lines will be ready for service April 1. They will replace the street cars. The company is making further surveys with the idea in mind of substituting buses on other outlying branches of the system.

Financial and Corporate

Foreclosure Proceedings
Requested for Boston & Worcester

Upon the recommendation of the reorganization committee of the Boston & Worcester Street Railway, the American Trust Company, as trustee under the bond mortgages of the company, filed, Jan. 27, in the Supreme Judicial Court at Cambridge, bills for the foreclosure of the mortgages and a petition requesting the court to appoint a receiver. The liabilities of the railway consist mainly of bonds which matured Aug. 1, 1923, and unpaid interest thereon. The company has outstanding in the hands of the public a total of \$2,297,000 bonds, of which \$1,841,000 has been deposited under the reorganization plan of July 16, 1924.

The new reorganization plan, dated July 16, 1924, provided \$296,940 for improvements. This plan was explained in the *ELECTRIC RAILWAY JOURNAL*, issue of Dec. 20, 1924.

The reorganization committee requested foreclosure proceedings at this time as it felt it was to the advantage of the bondholders and in furtherance of the reorganization of the property.

The reorganization committee issued a letter to bondholders on Jan. 27 stating that foreclosure proceedings would be simplified and the reorganization of the company completed more promptly if holders of undeposited bonds will immediately deposit their bonds with the American Trust Company.

The Boston & Worcester Street Railway operates an interurban line between Boston and Worcester and branch lines in the towns of Natick, Framingham, Southborough and Hudson and in the city of Marlborough. The total trackage operated is about 113 miles.

Report of Impending Deal at
Portland Confirmed

Holders of common stock of the Cumberland County Power & Light Company, Portland, Me., have been offered an opportunity to dispose of their stock for a sum that, plus accrued dividends to the date of settlement, amounts to \$137.26 per share. The offer comes by letter to all holders of common stock through E. W. Clark & Company, Philadelphia, and J. & W. Seligman & Company, New York.

The letter states that these two concerns have been offered an opportunity to dispose of their stock for \$137.50 per share plus accrued dividends to the date of settlement with the purchasers, the Albert Emanuel Company, New York City.

They offer to other holders of common stock an opportunity to dispose of their stock at the same figure minus \$1 per share, which constitutes the charge to cover legal fees and other expenses, and the services of the two bond houses in disposing of the stocks.

The terms of the offer include a request that holders of common stock

who are disposed to sell it at this price deposit the stock with the Seaboard National Bank, Mercantile Branch, New York City, on or before Feb. 10. The date agreed upon for the purchaser to make settlement is Feb. 16.

Danbury-Bethel Lines Purchased

Edward M. Bradley of the firm of H. C. Warren & Company, investment brokers, of New Haven, as chairman of the bondholders' protective committee, has purchased for \$75,000, plus the

outstanding debt against the company, the property of the Danbury-Bethel Street Railway, Danbury, Conn. The sale was under an order from the Superior Court and was conducted in Danbury on Jan. 15 by James E. Wheeler of this city.

Under the terms of the sale, the purchaser is to assume the receiver's obligations, which amount to \$251,000, of which \$128,328 is disputed. Receiver Judge J. Mosa Ives of Danbury will remain in charge of affairs of the road until the court passes upon the claims.

The road recently was appraised at \$529,981. The bondholders, who were the plaintiffs in the foreclosure proceedings, claim that there is due on the mortgage \$279,166. The taking over of the property by the bondholders was referred to previously in these pages.

A Bargain at \$162,834,584

Chicago Engineers Hold This Price Reasonable as Amount to Be Paid
by City for Surface Lines—Interesting Comment by Engineers
on Individual Items Included in Appraisal

THREE utility engineers, waiving agreement on a specific value, have decided that the Chicago Surface Lines would be a bargain at \$162,834,584. The engineers, two representing extremes in seeking a valuation figure and the third brought in by their choice as a referee, made the appraisal at the instance of the Chicago City Council committee on local transportation and a committee of bankers holding surface lines securities.

The figure of \$162,834,584 used is the value fixed in the 1907 ordinances, soon to expire, which shall be the maximum price paid by the city in event of purchase. Mayor Dever and the traction owners said they would adhere to the ordinance, but a dispute arose over ownership of the company's \$19,000,000 replacement fund. The owners said that if the city took it this would in effect cut the price to \$19,000,000 under the ordinance figure. The engineers upheld the Mayor's contention that the money should go with the lines.

William Barclay Parsons, New York; William J. Hagenah for the traction company and R. F. Kelker, Jr., for the city, made the appraisal. Each had his own figures. They varied widely. On reproduction value, less depreciation, the figures follow:

Kelker	\$176,500,000
Hagenah	204,308,669
Parsons	196,500,000*

*Kelker's estimate, plus \$20,000,000 going concern value, explained below in finding No. 2.

On "original cost" two of the figures were the same but were arrived at in different manners. They are:

Kelker	\$141,773,000
Hagenah	167,180,727
Parsons	167,180,727

The appraisers find that the property consists of 1,062 miles of single track, 3,540 passenger cars, of which 36 are under construction; 256 single-truck T.V.C. passenger cars held in reserve, 555 service cars, 21 carhouses, 20 substations, two storage battery stations, two main car repair shops, several hundred miscellaneous buildings and 147

parcels of real estate. All property is declared to be in fine condition.

Eight factors were given the engineers and their findings under each may be briefly summarized as follows:

1. Original cost of plant and permanent additions and improvements so far as the same is ascertainable from existing valuations, inventories and such other data available.

Major Kelker takes "original cost" to mean the cost of the existing properties to the present owners and from the facts available places this at \$141,773,000.

Mr. Hagenah takes as a base the 1907 compromise figure of \$55,775,000, to which he adds property additions made according to ordinances and property acquired and temporarily financed through the special renewal and equipment fund. Total \$167,180,727.

Mr. Parsons uses the Hagenah figure, but bases it upon "historical cost" plus Hagenah's other figures. In the absence of definite evidence he accepts the 1907 compromise figure tentatively as the "historical cost."

2. Reproduction cost less depreciation; i.e., what it would cost the city to reproduce these properties less depreciation, taking into account the cash and property in the renewal and depreciation funds.

Major Kelker holds that the construction work best would be accomplished by the companies rather than by contractors, and, deducting depreciation, arrives at \$176,500,000.

Mr. Hagenah visualizes a reproduction "using the construction methods and equipment ordinarily employed in such work, the undertaking being carried on under a continuous construction program and with sufficient funds available, but assembling a special construction organization. Value, \$245,621,621 for a new plant; deducting depreciation, \$204,308,669, exclusive of going concern value and cash working capital."

Mr. Parsons sustains Major Kelker's method, but holds it falls short in not assuming that the experience and organization of such a going concern are

to be used and therefore are entitled to a representation in the value. He adds to Major Kelker's figure the going concern value as determined in finding No. 5.

3. The amount and market value of stocks and bonds. Discusses average values from 1907 to date.

4. Present and probable future earning capacity. Estimated earnings for year ending Jan. 31, 1925, deducting city's 55 per cent, taxes and renewal fund contributions, \$9,463,962. On the assumed purchase price at 5 per cent the city would have fixed interest charges of \$8,142,179. For the past four years the company's share of net returns has averaged \$1,635,383 in excess of the sum set as the city's fixed interest. The undivided net earnings, however, have averaged \$14,752,713, or nearly twice these fixed charges. A moderate yearly increase is indicated, the number of revenue passengers in the years 1925-1945 increasing from 824,000,000 to 1,354,000,000.

The engineers say that assuming the properties shall be operated efficiently, the present and prospective net earnings warrant the city in making the purchase at the ordinance purchase price.

5. Going concern value. Awards ranging up to 20 per cent of the "bare bones" value were cited along with court decisions, but no percentage agreement was arrived at and the engineers compromised on the figure adopted in 1920 by the Illinois Commerce Commission for rate-making purposes, \$20,000,000.

PHYSICAL CONDITION OF PROPERTIES EXCELLENT

6. Present physical condition. We find the present physical condition of these properties excellent. Viewed from the practical point of operating condition, the equipment, tracks and buildings are being well maintained. In setting up the item of deductions in the estimate for reproduction costs, the appraisers have had in mind fixing a figure which had direct relation to the purchase price of the property and not to its momentary physical condition from the operating standpoint.

The amount set aside for renewal and depreciation reserves have been so much in excess of renewal expenditures to date that an accumulation of approximately \$19,000,000 against accruing wear to track, equipment, etc., is provided for.

7. Fair cash market value of real estate. Special appraisers find fair cash value of land without buildings or improvements \$8,937,277. Additional real estate not used for railroad operation \$76,604.95.

8. Allowances for value of unexpired franchises. None.

9. The appraisers find the present fair value of these properties for the purpose of purchase by the city, taking into consideration all the above-mentioned eight factors, to be in excess of \$162,834,584, the price fixed by the ordinance, this sum to be adjudged to care for subsequent additions or deductions made between Oct. 31, 1924, and the date of the transfer.

The sections in which the engineers settled the disposition of the disputed

\$19,000,000 in the city's favor were taken up separately from the factors. The vital paragraphs referring to the fund follow:

Under the provisions of the settlement ordinance the operating company is required to set aside 8 per cent of its gross receipts as a renewal fund to insure the proper upkeep of the properties. The residue receipts, after paying all operating expenses and taxes, are applied first to pay 5 per cent on the purchase price, and the remainder is divided between the city and the company in the ratio of 55 per cent and 45 per cent, respectively.

The contributions to the renewal fund have been in excess of the current requirement thus far found necessary, so that on Oct. 31, 1924, this fund consisted of \$14,716,506 in cash and \$4,337,142 in new equipment and track purchased out of the fund but not added to the purchase price. A sale of the properties to the city under the existing ordinances would carry with it this renewal fund and its further accumulations to the date of the actual transfer as well as the equipment purchased out of this fund.

The amount of the purchase price will be subject to constant increase as additions are made to the properties from time to time and in like manner the renewal fund will be increased or diminished as contributions are added from gross receipts or payments made for renewals. Both figures are, therefore, subject to correction to be fixed at the date of the transfer of the properties, should such transfer be effected. These additions or withdrawals in the near future are not likely to be of such moment as to modify to any extent the conclusions in this report.

The ordinances fix the price at which the city can buy and at which the company shall sell at the option of the city. The ordinances provide that this sum shall be payable in cash, although, of course, it may be paid in other form if both parties agree.

New York Railways Reorganization a Step Nearer

Approval of the plan of reorganization of the New York Railways, New York City, has been obtained from the three protective committees representing holders of Broadway & Seventh Avenue Railroad first consolidated 5 per cent mortgage gold bonds; Broadway Surface Railroad 5 per cent first mortgage bonds, and South Ferry Railroad 5 per cent first mortgage bonds. Notices to this effect were published on Jan. 27 by the reorganization committee.

The way now seems clear to declare the reorganization plan effective. The plan has been approved by the court and the Transit Commission.

Dividend to Be Paid

Chicago City & Connecting Railways, the collateral trust holding shares representing about 40 per cent of the value of the Chicago Surface Lines, will pay \$1 dividend Feb. 25 to stockholders of record Feb. 16 on 250,000 preferred participation shares. The dividend, the first since 1918, comes from accumulation for several years of income over bond interest requirements. In his annual report, Bernard E. Sunny, chairman of the board, tells of the dawn of a better transportation era for Chicago. "Any change to be made," he says, "is all to the good. Negotiations with the city have brought out much information about the properties that has been enlightening and has increased the interest and confidence in them." He said that the statement made in the last annual report that Chicago had the best railway property in the world had recently been repeated by high officials of the city, which had helped

to repair the injury to the reputation of the properties caused by derogatory reports previously circulated. Income received by the trust amounts to \$1,219,525 compared with \$1,252,260 in 1923. Bond interest of \$1,041,300 and bond redemption of \$105,000 were the largest items against receipts. The balance sheet shows the trust holds \$597,000 or double the sum necessary for the dividend.

Toledo Made Good Showing in December

For the first time in many months the Community Traction Company, Toledo, Ohio, had a surplus in December, 1924. After all charges this surplus was \$24,630. The expenses were \$224,728, including \$15,000 for extraordinary maintenance, as against expenses of \$240,297 for the similar month the year previous. The gross revenue for December was \$340,761, compared with \$344,654 for December, 1923. Bus operations on the feeder lines showed improvement with increased riding.

Sinking fund requirements for 1924 were \$226,543. The showing here sustains the recent observations of board members that the company would now be breaking even and providing a profit were it not for the city-purchase plan written into the Milner ordinance. The sinking fund has already provided for the retirement of \$722,000 of bonds of the company and there is added \$183,483 cash in the fund. This is approximately 10 per cent of the capital value of the company. When this fund reaches 20 per cent the present set-up for the sinking fund may be done away with and in extensions of the franchise the fund may be allowed to pay its way, retiring every year 1 per cent of the amount of capital value that is outstanding.

Acting Commissioner E. L. Graumlich indicated that January would show about an even break. He announced also that the maintenance program for 1925 was set at \$680,000, compared with \$770,000 for 1924 and \$640,000 the previous year. In 1924 the company began with about \$50,000 deficit in the maintenance fund. The present year is starting with about a similar amount of cash on hand in the maintenance fund.

Committee Will Appraise Rainier Property

Negotiations for the purchase by the city of Seattle, Wash., of the Seattle & Rainier Valley Railway will probably be undertaken in the near future, following steps taken by the City Council for an appraisal of the company's property. John C. Higgins, counsel for the Rainier Valley line, declares that his company is ready to sell to the city, providing satisfactory terms can be arranged. The bonded indebtedness of the system, he reported, is between \$1,500,000 and \$1,600,000, the debt secured by first and second mortgages aggregating about \$1,000,000 and third mortgages of \$550,000. In addition, there is outstanding approximately \$350,000 of the company's stock to participate in any liquidation.

Cleveland Interest Fund Up

**Economy and Efficiency in Operation
There Reflected in Report for Year
—Need for New Financing**

Ways and means of financing extensions and betterments by the Cleveland Railway, Cleveland, Ohio, will have to be found during the present year. John J. Stanley, president, so reported in his message to stockholders of the company presented at the annual meeting on Jan. 28. Mr. Stanley pointed out that not in four years has the company really added to its capital account through the sale of stock, and that minor betterments made during the past four years have come from funds derived from retirement of other property. He said:

Our franchise provides that we may not pay more than 6 per cent for money. During the past few years money has been worth more than 6 per cent. It is now worth more than 6 per cent. This means that our property will not be enlarged until we are authorized to pay a higher rate of interest or until the general market price of money drops to or below 6 per cent. Cleveland needs extensions and betterments of its street railway system. The growth of the city in population and area means that this growth ought to be met by service adequate to take care of it and greater service calls for more tracks, rolling stock, buildings and power.

The grant under which the Cleveland Railway operates provides that no stock can be sold at less than par, and at no time during 1924 was the stock of the company at this figure. Its high was 96 and its low 85.

Mr. Stanley pointed out that since the year 1910, when the Tayer service-at-cost grant went into effect, Cleveland car riders have been saved \$53,702,632, representing the difference between the average rate of fare paid in Cleveland during that time, which was 4.315 cents, and that paid in ten other large cities in the country, which was 5.814 cents. This, he said, meant an average yearly saving to car riders of \$3,835,902. The average income received per ride last year amounted to 4.47 cents.

The total revenue of the Cleveland Railway in 1924 was \$17,313,548, an increase of 5.94 per cent, while the actual expenses for the year were \$16,905,151, divided this way:

For maintenance, renewal and depreciation, \$4,463,252; for operation and general expenses, \$9,139,686; taxes \$1,279,741; interest on bonds and dividends on stock \$2,022,471.

As usual, wages paid conductors, motormen and trainmen took the largest slice of the operating expenses, namely, \$4,543,791.

For injuries and damages, the company in 1924 spent \$1,170,799, a decrease over the previous year of \$411,796.

Taxes of the company, however, increased \$197,546.

The number of car riders in 1924 decreased 6.46 per cent, or from 417,405,905 riders in 1923 to 390,424,469 in 1924.

The company operated 38,084,832 passenger car miles in 1924, a decrease of 4.66 per cent.

The amount paid by the company to tax-spending authorities and the cost of injuries and damages combined totaled \$2,450,540. This was \$428,068 more than was received by the people as

interest on their investment in the bonds and stock of the company.

During 1924 the company operated at its maximum rate of fare, 6 cents cash, 9 tickets for 50 cents and 1 cent for transfer. It added 16 trailers and 25 new motor cars to replace equipment retired, and also relaid 11 miles of track.

At the end of 1923 there was a deficit of \$544,221 in the interest fund, which is the fare barometer. As a result of the economy and efficiency in operation in 1924 the interest fund at the end of 1924 contained a balance of \$532,254, this despite the fact that fewer riders were carried in 1924 than in 1923. When this fund reaches \$700,000 the rate of fare must automatically drop one notch and when the fund goes below \$300,000 the fare is increased.

The number of stockholders in the company is 6,222, of whom 5,532 live in Ohio and 4,135 in Cuyahoga County.

New Interests in Columbus Company Elect Representatives

The management destinies of the Columbus Railway, Power & Light Company, Columbus, Ohio, are now in the hands of Clarence C. Slater. He started Jan. 27, the day of the annual meeting of the company, as general manager. He finished as vice-president and general manager.

Charles L. Kurtz, president, and D. Meade Massie have resigned. Cyrus S. Eaton, Cleveland, who owns the controlling interest in the Continental Gas & Electric Company, and Frank Hulswitt, Chicago, president of the United Power & Light Company, representing interests which recently obtained control of the Columbus organization, wanted Mr. Kurtz to stay as president, but he withdrew of his own accord as president because he believed that he was entitled to a much-needed rest. He has served with distinction as president of the company since the change in control in 1919 that resulted in the election of Ohio men as executives of the company.

The directors adjourned without naming a successor to Mr. Kurtz. They are expected to meet within the next three weeks to announce their choice. Mr. Eaton was named second vice-president to succeed William A. Gill, resigned. No one was selected to fill the post of treasurer, recently vacated by Norman McD. Crawford.

P. V. Burington, secretary and auditor of the company for nearly 30 years, was retired with a pension. He was succeeded by Lyle F. Babbitt. Allen C. Beck was named assistant treasurer.

The new board of directors is composed of Messrs. Eaton, Hulswitt and Slater, Thomas Hoyt Jones, Edward W. Borer, and W. C. Williard, Walter B. Beebe, Frank L. Stein, J. B. Hanna, Ben W. Marr and Harry C. Holton.

Cincinnati stockholders, who opposed the refinancing plan, obtained amendments which conceded a 6½ per cent dividend to Series B preferred instead of 6 per cent.

The amendments were not passed upon at the stockholders' meeting. Instead action was deferred until Feb. 10,

when another session will be held to take final action. In view of the fact that the forces opposing the original plan, led by H. C. Eustis, Cincinnati broker, announced their satisfaction with the concessions made, it is believed that the plan will be carried without serious opposition.

In obtaining approval of the amended refinancing plan, the Eaton-Hulswitt forces agreed to put another \$1,500,000 into the company in the form of common stock purchase to strengthen the new first preferred. Mr. Eaton and his associates had agreed previously to purchase \$1,000,000 of common stock.

Rochester Railway and Bus Lines Fall Short in October Quarter

The combined returns of the New York State Railways, Rochester lines, and the Rochester Railways Co-ordinated Bus Lines failed by \$53,696 for the quarter ended Oct. 31, 1924, to meet the guaranteed return under the service-at-cost contract with the city, according to the report of Charles R. Barnes, Street Railway Commissioner. The railway lines fell short by \$50,183 and the bus lines by \$3,513.

Total revenues from railway operations were \$1,184,425, or 48.86 cents for each mile of the 2,424,257 car-miles run. Operating expenses were \$861,082, leaving a net revenue for railway operations of \$323,342.

The street cars for the period carried 23,023,412 passengers, of whom 30.67 per cent were transfer riders. The cross-town trackless trolleys carried 333,404 riders, of whom 83.1 per cent were transfer passengers. The Dewey Avenue feeder bus line transported 58,050 passengers, of whom 82 per cent were transfer riders.

Debentures Offered.—The National City Company, New York, is offering at 93½ and interest to yield 7.70 per cent \$10,000,000 of 20-year sinking fund 7 per cent debentures of the General Electric Company, Germany. Proceeds of the debenture issue will be used to reduce current liabilities, to increase working capital and also, to some extent, to install additional machinery.

Delinquent Property to Be Sold.—The City Treasurer of Portland, Ore., has given the final notice of sale of delinquent property in Portland, which includes the King Heights Electric line, which will be sold for delinquent assessments and taxes in the sum of \$11,669. The city officials may have to buy the line to protect the residents of the district served.

New Twin City Transit Directors.—At the annual meeting of stockholders of the Twin City Rapid Transit Company, Minneapolis, Minn., the following directors were elected for a term of three years: Horace Lowry, president of the Twin City Rapid Transit Company; E. W. Decker, president of the Northwestern National Bank, Minneapolis, and Frank Bergen, attorney, of Newark. A. E. Ames of A. E. Ames & Company, Toronto, was elected to fill a vacancy on the board for one year, as was Ralph Budd, president of the Great Northern Railway.

Wants Change in Stock.—The Bristol & Plainville Electric Company, Bristol, Conn., has certified to the Secretary of State an amendment to its charter which will permit a change in the par value of the company's stock by the vote of the board of directors.

Bonds Called.—Notice has been given that a portion of the American Electric Power Company's 5 per cent refunding convertible gold bonds dated Aug. 1, 1911, has been called for redemption. The company, formerly known as the American Railways, Philadelphia, Pa., will pay on Feb. 1, 1925, the face amount of such bonds drawn for redemption, with interest thereon to Feb. 1 next and a premium equal to 2 per cent of the principal thereof. Holders of the various bonds called for redemption are notified to present and surrender them with coupon due on Feb. 1, 1925, and all subsequent coupons attached.

Debentures Offered.—Pearsons-Taft Company, Chicago, is offering at 99½ and accrued interest, to yield more than 7 per cent, \$2,500,000 of series D 7 per cent convertible gold debentures of the Cities Service Company, New York, N. Y. The debentures, dated Dec. 1, 1919, and due Jan. 1, 1966, will be callable as a whole or in part at 102 and interest. The Cities Service Company owns directly or indirectly a majority of the common stock of more than 60 public utilities, comprising a large and successful system of electric light and power, street railway and more than 40 subsidiaries representing an important system of oil production, distribution, refining and marketing.

Value of Fresno Property Revised.—The California Railroad Commission, in a supplemental opinion and order, has fixed the value of property of the Fresno Traction Company as follows: Property within the city of Fresno, \$1,237,073; property outside of the city of Fresno, \$313,247; total property of Fresno Traction Company, \$1,550,320. This valuation is fixed as of June 30, 1922, to include investments added since the previous valuation was made by the commission. The value so fixed is the amount on which earnings are to be calculated in order to carry out the intent of Section 12 of the resettlement franchise which the railway was authorized to exercise by the commission on May 3, 1922.

Cities Service to Redeem Scrip.—A plan for the redemption of its scrip dividend payments, which were non-interest bearing and amounted simply to a promise at some future date to pay, has been worked out by the Cities Service Company. In accordance with the plan the company will pay out the equivalent of more than \$34,000,000. Of this, \$10,000,000 will be in cash and the rest in the form of stock which will pay a dividend. Culmination of the plan followed the issuance of non-interest bearing scrip since July 1, 1921, and the date set for the conversion of these paper promises into the actual cash or interest bearing securities was March 1 next. The development of the public utility business of the company was said to have warranted the expenditure.

Preferred Stocks Offered.—Stone & Webster, New York, are offering at 103, to yield 6.80 per cent, \$1,500,000 of 7 per cent cumulative preferred stock of the El Paso Electric Company, El Paso, Tex. The stock, known as series A, has a par value of \$100. It is redeemable at \$115. The proceeds from the sale of this preferred stock will be used to retire floating debt and for other corporate purposes.

Removal of Tracks Allowed.—The Pacific Electric Railway, Los Angeles, has been authorized by the California Railroad Commission to abandon and remove its tracks on the West Colorado Street and Orange Grove Avenue line, the Los Robles Avenue and Washington Street line and the California Street line in the city of Pasadena. Bus service has been substituted for the railway service.

Tramway to Abandon Line.—The Colorado Springs & Interurban Railway, Colorado Springs, Col., on Jan 3 was authorized by the State Public Utilities Commission to abandon its line known as the Roswell loop. Roswell is a suburb of the Springs. The railway is permitted to remove its tracks and pole line.

Authorized to Abandon Appurtenances.—The Nevada County Traction Company has been authorized by the California Railroad Commission to abandon and remove its railroad, tracks and appurtenances in the city of Grass Valley, Nevada County. It was shown at the hearing of the application that operations were carried on during 1923 at a net corporate loss of \$5,377. Regular operation was suspended on Dec. 7, 1923, by reason of snow conditions, and has never been resumed due to inability of the company to obtain funds to finance operations.

Suit Over Railway Control Dismissed.—The bill in equity filed by Mary Walker Boggs, wife of the late R. H. Boggs, department store owner and traction magnate, in an effort to obtain the return of control of the Pittsburgh, Butler, Harmony & New Castle Railway, New Brighton, Pa., from David I. McCahill and his associates has been dismissed in an opinion handed down by Judge James R. Macfarlane. It was alleged by Mrs. Boggs that control of the railway was procured from her late husband without his receiving any compensation in return. The bill in equity sought an accounting and suggested the court order the stock of the company, which was apportioned to McCahill and his associates, returned to the Boggs estate. The court held, in short, that no duty devolved upon it to revise a disposition or "exchange of property made by an unusually capable business man" who took no steps toward that end in his own lifetime.

Sale of Niagara Gorge Road Approved.—The New York Public Service Commission has approved the sale of the entire outstanding capital stock of the Niagara Gorge Railroad to the Niagara Falls Power Company. E. E. Nicklis, who has been superintendent of the railway, will continue in this capacity. Other officers elected at the organization meeting are: A. H. Schoellkopf, president; Bert L. Jones,

vice-president and general manager; Mrs. Joseph T. Jones and Ross R. Coddington, second and third vice-presidents, respectively; G. L. Corliss, secretary and assistant treasurer, and W. Paxton Little, treasurer. A. H. Schoellkopf, J. F. Schoellkopf, Jr., R. J. Hutton, Morris Cohn, Jr., and Ross R. Coddington were added to the directorate.

Book Reviews

Stinnes and His Enterprises (Stinnes und Seine Konzerne)

By Paul Ufermann and Carl Hüglin; Berlin, Verlag für Sozialwissenschaft. 206 pages.

Through the Siemens-Halske and Schuckert companies, which he controlled, Stinnes was for many years a very active figure in electrical development in Europe, Asia and South America. His promotion work was aggressive, and the combination of steel, chemical, banking, shipping and electrical manufacturing interests under his direction gave him great power. This book describes the corporate relations of his various companies, some of which were electric railway, and it contains nearly 100 corporation charts.

The Journal of Land and Public Utility Economics

Vol. I, No. 1. Quarterly. Published by A. W. Shaw Company, Chicago.

The Institute for Research in Land Economics and Public Utilities, of which Richard T. Ely, of Madison, Wis., is director, has assumed editorial responsibility for the new quarterly mentioned above. Dr. Ely is its editor in chief. The first number contains several articles of special interest to electric railway operators. Ralph Heilman, dean of Northwestern University School of Commerce, contributes an article on "Customer Ownership of Public Utilities," in which he speaks of its advantages and also of its dangers. Herbert E. Simpson, a research associate of the Institute, contributes an extended discussion on taxation of public service industry, with many statistics and charts, in which some interesting facts are given on electric railway taxation. Other articles of interest to electric railways concern the prevention of waste by city planning and the water power situation and the United States.

The Automobile: Its Province and Problems

The *Annals of the American Academy of Political and Social Science* for November, 1924, is devoted entirely to the automobile, its province and its problems. Altogether there are 50 contributed articles. The topics included: The services of the automobile; the manufacture and sale of automobiles, the home, the school and the church; the place of the motor in our transportation system; the building and financing of motor highways; the safety of the highways through traffic regulation. The contributors include men prominent in automobile manufacture, highway engineers, and others familiar with the topics on which they treat.

Personal Items

Harry Brown Joins Ohio Brass Company

Executive Editor of the "Journal" Resigns to Accept Executive Position with Manufacturer—Mr. Buck to Be Acting Head of Staff

Harry L. Brown, editor *ELECTRIC RAILWAY JOURNAL*, has resigned, effective February 1, to become an executive of the Ohio Brass Company, Mansfield, Ohio. Mr. Brown has been connected with the McGraw-Hill Company for the past 10 years. He started with the company as an assistant editor of *Electrical World* early in 1915. The following year he transferred to the position of Western editorial representative of the *ELECTRIC RAILWAY JOURNAL* in Chicago and subsequently was promoted to Western editor. In April, 1922, he moved to New York to become managing editor of the *JOURNAL* and then on January 1, 1923, was made co-editor with Henry W. Blake and placed in executive charge.

The earlier experience of Mr. Brown began with the degree of bachelor of electrical engineering from the University of Michigan. For two years before taking up editorial duties he was engaged in engineering work with the Aurora, Elgin & Chicago Railroad and the Chicago Telephone Company. During the war he was first lieutenant and captain in the Signal Corps. In this work he had a great deal to do with radio and after the war was co-author of Lauer and Brown's "Radio Engineering Principles," a successful college text book.

Mr. Brown's editorial work and broad contact in the power and electric railway fields have given him a very wide acquaintance and an intimate knowledge of the problems and progress of these industries. His studies of electric railway and bus transportation were extended to foreign countries during the summer of 1924 in the trip made to Europe by a committee of the American Electric Railway Association, of which he was a member. The report of this committee was presented at the annual convention of the American Association last October and published in the *ELECTRIC RAILWAY JOURNAL* for Sept. 20, 1924. It seems to have made a profound impression both in this country and abroad, as the committee continues to receive congratulatory letters on the value and usefulness of the matter presented.

As executive editor of the *JOURNAL*, much of Mr. Brown's work has been concerned with making the paper's policies more aggressive and its articles more practical. The staff has been strengthened by adding several new men drawn from active railway work. It is generally conceded that the paper is more valuable to the industry today than ever before. Its leadership is unquestioned. Its campaigns for the newer developments have been of far

reaching effect in helping to restore the industry to a sound condition.

For several years past Mr. Brown has consistently emphasized in the paper an optimistic view of the outlook for the industry, because of his firm belief in its fundamental soundness. He has been an ardent advocate of measures to improve public relations and to merchandise the service, particularly those having to do with modernization of the railway plant and operating methods. He was one of those who first urged adoption of the bus by railway companies where suitable as an adjunct to their service,



H. L. Brown

for he sensed the value of the bus as a new transportation tool.

The success which has attended Mr. Brown's efforts is perhaps best attested by the enhanced position of the *JOURNAL* among the leading men of the industry. His associates deeply regret his retirement from the paper. But a strong editorial staff has been built up which will carry on aggressively the policies established under Mr. Brown's direction. To this end, Morris Buck, managing editor, is made acting head of the staff.

Charles Currie Heads South Bend Road

Another honor has been bestowed upon Charles Currie, who has been actively identified with the electric railway industry for more than 30 years. He has just been elected to the presidency of the Chicago, Lake Shore & South Bend Railroad, which he has served as acting vice-president.

In addition to holding this position, Mr. Currie also is president of the London Street Railway, London, Canada, and a director of the Northern Ohio Traction & Light Company, the

Lake Shore Electric Railway and the Cleveland, Painesville & Eastern Railway. He was vice-president and general manager of the Northern Ohio Traction & Light Company up to 1916.

Mr. Currie has made Michigan City his headquarters for the past year, having assumed the duties of the late C. N. Wilcoxon, who headed the Chicago, Lake Shore & South Bend Railway. Mr. Currie is about 55 years of age.

N. McD. Crawford Retires

Executive of Columbus, Ohio, Property Withdraws from Utility Field After Forty Years of Service

Norman McD. Crawford has resigned as vice-president and treasurer of the Columbus Railway, Power & Light Company, Columbus, Ohio. Mr. Crawford is leaving the organization because of a wish to retire from active business. He has no plans for the future other than taking a much-needed rest. He has been at work more than 40 years and believes that the time has come for him to retire from active participation in the management of public utilities. Mr. Crawford's resignation is to become effective at the convenience of the board of directors of the company, but not later than March 1.

Mr. Crawford has been connected with the company at Columbus since 1916. He went to Columbus early that year as the representative of the E. W. Clark & Company Management Corporation. The following March he was elected vice-president of the company to assist S. G. McMeen of the Management Corporation, then president of the Columbus Railway, Power & Light Company. At the time of the change in control of the property at Columbus several years ago the wide experience of Mr. Crawford was quickly appreciated by the new interests in the company, and he continued with it undisturbed as to the scope of his activities.

Mr. Crawford is particularly well known in the East. As he himself has said, he has been in business more than 40 years. As a matter of fact, as a contractor, he built the Glastonbury line of the Hartford Street Railway, Hartford, Conn., as long ago as 1892, and was afterward retained by the company as engineer. In 1894 he was made general manager of the company, which position he held until the Hartford Street Railway was taken over by the Connecticut Company. In December, 1908, Mr. Crawford was elected president of the Mahoning & Shenango Railway & Light Company. Later he became connected with the Reading Transit & Light Company, Reading, Pa., which property he served as president and general manager. He was also for several years vice-president of the Ohio Electric Railway, Cincinnati.

The scope of Mr. Crawford's activities is well illustrated by the posts he filled at Youngstown and at Reading. The Mahoning & Shenango Railway & Light Company owns and controls electric railways at Youngstown, Warren, Niles and other cities in Ohio and in Newcastle, Sharon, Wheatland and Sharpsville in Pennsylvania, and the lighting properties in Youngstown, Newcastle, Sharon and Sharpsville. In

all, that company operates 145 miles of electric railway.

The Reading company controls the lines in and around Reading, Pa. In addition to being president and general manager of the Reading Transit Company, Mr. Crawford was also vice-president and general manager of the Neversink Mountain Railway and vice-president and general manager of the Oley Valley Railway, Reading, also vice-president and general manager of the Metropolitan Electric Company.

In 1906 Mr. Crawford spent 6 months in Europe investigating electric railway conditions there for the committee on public ownership and operation of the National Civic Federation. His conclusions, with those of his associates in the investigation, were embodied later in several volumes on the subject, published by the federation.

Personnel of Bus Division Announced

Under a new plan of organization of the West Chester Street Railway, West Chester, Pa., made necessary by the taking over of the West Chester Transportation Company, operating buses in Chester and Montgomery Counties in southeastern Pennsylvania, C. W. Christensen will be general superintendent of motor coach operation and also will head the personnel and public relations departments. Mr. Christensen was formerly with the Bell telephone system. Three divisions of the bus system will be established as follows:

Wilmington Division, Lewis Souder, division superintendent, to include the routes between Wilmington and Chester; Wilmington, Avondale, West Grove and Oxford; Wilmington and Kennett Square, via Hamorton; Wilmington and Kennett Square, via Hockessin.

West Chester Division, Henry Corcoran, division superintendent, routes between West Chester and Pottstown; West Chester and Norristown; West Chester and Wilmington; West Chester and Chester; Media and Kennett Square; Downingtown, Strafford and other Lincoln Highway points.

Phoenixville Division, Eli Stoltzfuss, division superintendent, routes between Phoenixville and West Chester; Phoenixville and Norristown; Phoenixville and Valley Forge; Phoenixville and Spring City, Royersford, Phoenixville and Collegeville.

P. J. Duffy Heads New Transportation Department in Chicago

P. J. Duffy was appointed, effective Jan. 1, superintendent of the central division of the Chicago Surface Lines transportation department. Mr. Duffy, one of the oldest employees in point of service of that organization, started work in 1876, during the horse car days, with the Chicago West Division Street Railway. In 1898 he was appointed assistant station superintendent. Two years later he became station superintendent. With the formation of the Chicago Surface Lines in 1914 he was appointed assistant division superintendent and continued in that position until 1923, when he was transferred to the headquarters of the transportation

department with a special assignment in contact with the downtown traffic police. Out of this arrangement grew the plans for the formation of the new central division, through which it is hoped to get more effective co-operation with the police department in directing traffic through the loop district. Twelve supervisors have been assigned to Superintendent Duffy to help direct this work. Reference to the creation of this new department is made elsewhere in this issue.

W. B. Wheeler Advanced with Third Avenue Railway

William B. Wheeler has been appointed assistant superintendent of transportation of the Third Avenue Railway, New York, under William E. Thompson, vice-president and superintendent of transportation. Mr. Wheeler started as a conductor with the Atlantic Avenue Railroad, Brooklyn, in 1894. He left that company in 1897 to become connected with the Metropolitan Street Railway, operating the Broadway line in New York City. At that



W. B. Wheeler

time the line was operated by cable. In 1898 Mr. Wheeler was transferred to the Lenox Avenue Railway, 146th Street and Lenox Avenue, then operating the first underground conduit system in New York City. Here he was made starter. The Lexington Avenue line was changed over from cable to underground conduit in 1901, and Mr. Wheeler was sent to that line as depot starter. On Dec. 2, 1903, he began to serve the Dry Dock, East Broadway & Battery Railway, the Central Crossover Street Railway and the Metropolitan Street Railway, all operating out of the Avenue B depot. In July, 1908, Mr. Wheeler was made superintendent of the Westchester Electric Railroad, which operates in Mount Vernon, New Rochelle and other towns in Westchester County. He was general superintendent under the receiver in entire charge of the property. In December, 1919, he went to the Third Avenue Railway as superintendent of schedules. He has continued in that capacity since that time.

Alfred H. Schoellkopf, vice-president of the Niagara Falls Power Company, Niagara Falls, N. Y., has been elected

president of the Niagara Gorge Railroad, taken over recently by the power company principally because of the strategic position of the railway with respect to future power development plans at the falls.

Archie Andrews, a veteran employee of the Rockford & Interurban Railway, Rockford, Ill., has been advanced to the position of general superintendent, to succeed J. A. Phelan, who resigned recently to become connected with the Chicago Motor Coach Company.

George A. Henshaw, recently appointed co-receiver of the Oklahoma Railway, Oklahoma City, Okla., was at one time a member of the Oklahoma constitutional convention, Assistant Attorney-General under Charles West from 1907 to 1911 and a member of the State Corporation Commission from 1911 to 1917. He has been a prominent practicing attorney in Oklahoma City since his retirement from the commission and has specialized in public utility cases before the commission and courts. He has, however, never represented the Oklahoma Railway in any capacity.

Clark G. Anderson, general manager and assistant to the president of the Arkansas Valley Interurban Railway, Wichita, Kan., resigned on Jan. 1 to accept a position of cashier with the Fifth Avenue Trust & Savings Bank, Moline. Mr. Anderson was head of the Wichita property only since last July, when he resigned as manager of the Clinton, Davenport & Muscatine Railway, Moline, Ill. He started upon a public career in Moline as city engineer. In this capacity he served 6 years. His ability gained for him a place on the first city commission when the form of government was changed. He began service with the interurban railway at Moline in 1914.

Robert Ridgway, chief engineer of the New York City Board of Transportation, has been elected president of the American Society of Civil Engineers. Mr. Ridgway has been identified with rapid transit construction in New York City 25 years. Just now he is engaged in the task of designing and planning New York City's new subway system intended for municipal operation. Mr. Ridgway joined the Public Service Commission in 1912 in charge of the supervision of subways and elevated lines, including five tunnels under the East and Harlem Rivers, embracing 620 miles of single track at a construction cost of more than \$200,000,000.

Obituary

W. A. House

William Alexander House, formerly president of the United Railways & Electric Company, Baltimore, Md., died in that city on Jan. 27, aged 64 years. He had been ill only a few days. The malady to which he succumbed was diagnosed as pneumonia.

Mr. House retired from the United Railways & Electric Company in 1917. He saw many years of active service

with the railways in that city and was an inexhaustible source of information with respect to all of their operations. He was chivalry itself and all his letters, no matter how prosaic their subject, reflected this attitude of the man. His bold flowing hand and the personal touch that he gave to his letters marked him as a man of unusual characteristics.

In fact, it often seemed that all the letters that went out from the company during the time he was president were signed by him. For the last seven years Mr. House had not been actively engaged in business. He had earned for himself the right to take things easy after 37 years of active service with the local lines in his native city, and this he did.

It was in 1879 that he entered the employ of the old People's Passenger Railway as an assistant in the accounting department. He served in this and other departments until 1883, when the People's company was reorganized with T. E. Hambleton as president. At that time Mr. House was made secretary and general superintendent of the new company. In 1889 the People's Railway was succeeded by the Baltimore Traction Company, and soon thereafter Mr. House was made general manager of the combined properties. In this capacity in the year 1892 the work was carried on by him of electrifying the lines in Baltimore. In recognition of his faithful service there came in 1895 his election to the vice-presidency of the company, in addition to his duties as general manager. The following year Mr. House was elected president of the combined properties to succeed ex-Governor Frank Brown.

In 1897 another consolidation of Baltimore properties was effected, the City & Suburban and Baltimore Traction Companies being merged into the new Baltimore Consolidated Railway, with Nelson Perin as president. Mr. House was made vice-president and general manager of this company. Two years later there was effected the consolidation which brought into one company all the traction properties in Baltimore. The company that succeeded to the different independent lines was the United Railways & Electric Company, with which Mr. House became connected as second vice-president and general manager. In 1907, shortly after the death of John M. Hood, he succeeded to the presidency.

Mr. House in the various offices that he held with the railway passed through some very trying experiences, but probably the most difficult problems he was called upon to solve followed the terrible fire in Baltimore in 1904. In this conflagration the central power station of the company and many miles of track and line were destroyed. In the work of reconstruction everybody did his part, but the job of directing the work of reconstruction fell to Mr. House and made unusual demands upon him.

It is 20 years since those trying experiences, but in the electric railway world the memory still lingers of the celerity with which the reconstruction of the system was carried out and of the part that Mr. House played in re-

storing order so far as the properties under his direction were concerned.

Earl J. Payden, manager of the Rock Island Southern Railway, Rock Island, Ill., several years ago, a member of the Chicago Traffic Club and in recent years associated with T. M. Cox in the central freight bureau in Galesburg, died Jan. 22 after an operation. Mr. Payden was 43 years old.

John Baillie Hamilton, commercial manager and tramway manager to the City Council of Leeds, England, died on Jan. 9 at the age of 69. He was at one time traffic superintendent and afterward assistant general manager of the Glasgow Corporation Tramways. He showed so much energy and ability that he was appointed general manager of the Leeds City Tramways more than 20 years ago. Under his sway the Leeds tramways developed into a great organization, with an annual revenue of about £1,000,000. Mr. Hamilton's organizing ability got further scope when he was appointed commercial manager to the corporation, a newly created post and one which has few if any analogies in Britain. As commercial manager he controlled more than 8,000 workpeople engaged in the tramway, cleansing and highways departments. He was one of the founders

of the Municipal Tramways Association and was connected also with the Tramways & Light Railways Association, Institute of Transport and Tramways National Joint Industrial Council.

Glenn G. Howe, for many years senior vice-president of the Link-Belt Company, Chicago, Ill., died in Muskegon, Mich., on Christmas Day, 1924. He joined the Link-Belt organization in 1877 as an office boy. When the three related interests, the Ewart Manufacturing Company, the Link-Belt Machinery Company and the Link-Belt Engineering Company, were merged as the Link-Belt Company, in 1906, Mr. Howe became vice-president in charge of the company's Indianapolis operations. Later he organized the Howe Chain Company at Muskegon.

Charles R. Guthrie, inspector for the Westinghouse Traction Brake Company in New York City, died on Dec. 28, 1924. Mr. Guthrie was graduated from the department of science and technology at Pratt Institute in 1923. He entered the employ of the Westinghouse Traction Brake Company as special apprentice at the Wilmerding shops on July 10, 1923, and on Aug. 1, 1924, was assigned to the New York office. His duties have been assumed by V. D. Bethge, already a member of the New York office staff.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Swiss Maker in American Market

Plans Large Manufacturing and Sales Activity—Investment of Upward of \$50,000,000 Contemplated

Laurence Wilder, American representative of Brown, Boveri & Company of Switzerland, makers of electric locomotives and equipment for power houses, announced on Jan. 26 that his company has decided to enter the American field. An initial investment of between \$35,000,000 and \$40,000,000 will be made. Negotiations are in progress for the purchase of a number of plants and the American Brown-Boveri & Company will probably be actively engaged in the electrical manufacturing business in this country within 90 days.

The plans call for the manufacture of all kinds of heavy electrical equipment. According to Mr. Wilder, the Brown-Boveri interests anticipate a good business in heavy traction and are prepared to furnish any type of system or locomotive desired. In Switzerland, Chile, France and Russia both direct-current and alternating-current electrifications have been made by this company, and a recent contribution has been the manufacture of several large Diesel-electric locomotives for the soviet government. Oil

breakers and power mercury rectifiers are among other lines of activity. The company expects to add a complete electrical line of American manufacture and Brown-Boveri design in a short time.

The company controls a wide range of patents covering electrical apparatus in use in Europe, but not yet in the American market. As examples, Mr. Wilder has mentioned the Buchli drive for locomotives and the mercury arc power rectifier. It is said that the company will so direct its efforts as to be prepared to participate in the electrification of American railroads and extension of the use of superpower.

Brown, Boveri & Company, with main offices and plant in Switzerland, hold a position in Europe similar to that of the leading electrical manufacturers in the United States. The company employs many thousands of operators, has subsidiary plants in Germany, France and Italy, and it is not so many years ago that it took over and absorbed the European plant of the Westinghouse Electric & Manufacturing Company. For the last two years Brown-Boveri has had an agency in the United States, the chief purpose of which has been to test out the American market for Brown-Boveri products. It is said to be generally recognized all over the world that in some of its fields of operation there is no counterpart for the products of the Swiss company.

Metal, Coal and Material Prices

Metals—New York		Jan. 27, 1925
Copper, electrolytic, cents per lb.	14.875	
Copper wire base, cents per lb.	17.25	
Lead, cents per lb.	9.95	
Zinc, cents per lb.	7.97	
Tin, Straits, cents per lb.	57.875	
Bituminous Coal f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	\$4.45	
Somerset mine run, Boston, net tons	2.125	
Pittsburgh mine run, Pittsburgh, net tons	1.95	
Franklin, Ill., screenings, Chicago, net tons	1.875	
Central, Ill., screenings, Chicago, net tons	1.45	
Kansas screenings, Kansas City, net tons	2.50	
Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	\$7.25	
Weatherproof wire base, N. Y., cents per lb.	20.00	
Cement, Chicago net prices, without bags	2.10	
Linseed oil (5-lb. lots), N. Y., per gal.	\$1.15	
White lead in oil (100-lb. keg), N. Y., cents per lb., earload lots	0.1347	
Turpentine (bbl. lots), N. Y., per gal.	0.94	

Yellow Coach to Expand

Lehman Brothers and Goldman, Sachs & Company, New York investment brokers, have acquired a substantial interest in the Yellow Coach Manufacturing Company, and Robert Lehman and John M. Hancock have been elected directors. Additional large factory development is indicated by the formation of a \$1,000,000 subsidiary to Yellow Cab of Chicago by John Hertz to operate "Drivurself" systems throughout the country. The passenger cars to be rented by the company, shown for the first time at the recent New York automobile show, will be made by the Yellow Coach Manufacturing Company.

Rolling Stock

United Railways, St. Louis, Mo., has ordered 15 White buses and has placed an order with the St. Louis Car Company for 15 steel bodies for these vehicles.

Houston Electric Company, Houston, Texas, it is reported, has purchased three new Reo buses from the R. W. Price Company, distributors for the Reo in Houston.

Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., is said to be in the market for buses to replace automotive equipment which has been in use on bus lines in Newport News recently taken over by the railway.

Youngstown Municipal Railway, Youngstown, Ohio, has arranged to replace the first seven buses used in Youngstown. The vehicles were authorized by the city of Youngstown under the provisions of its service-at-cost ordinance. The buses in question were Republic Knight chassis under bodies by Bender. The seven original bodies are being rebuilt for use upon the same number of White chassis. They were purchased and will be operated by the Youngstown Municipal Railway under the provisions of the service-at-cost ordinance.

Track and Line

Connecticut Company, New Haven, Conn., plans to relocate its tracks at Morse's Station, Woodmont, Conn., in

connection with proposed new highway improvements. The tracks will be straightened out, which will eliminate a dangerous curve.

Detroit Street Railways, Detroit, Mich., will construct considerable new trackage during the present year which it is estimated will save the department \$1,000 a day. The Jefferson-Grand River line will be split up, the Jefferson line being looped somewhere in the vicinity of City Hall and the Grand River around Capital Park. About \$75,000 will be expended for new tracks at the Woodward Avenue carhouse. It is planned to combine the Clairmount and St. Jean lines into a crosstown belt line. Other connecting links are to be built, including one hooking the Fenkell line with the Northwestern Belt line leading directly to the Highland Park Ford plant. The proposed double-track extension of the Trumbull line to Fort Street is announced. A new carhouse for the northeast section is also proposed to save dead mileage on the Davison line. In summing up these major parts of the 1925 construction program Ross Schram, general manager, stated they would mean more and better service to the car riders of Detroit and a considerable saving in the department's expenses.

Trade Notes

Col. Eugene C. Peck, after a service of almost 25 years as general superintendent and later as works manager of the Cleveland Twist Drill Company, Cleveland, Ohio, has retired from active management. He will continue as a stockholder in the company and as a member of the board of directors. Serving as a member of the American engineering standards committee, as chairman of the standardization committee of the A. S. M. E. and as vice-chairman of the National Screw Thread Commission, he has been largely responsible for many of the much-needed reforms that have taken place in standards of practice.

Eisemann Magneto Corporation, New York, N. Y., announces that arrangements have been completed for the acquisition of the automotive business of the Duplex Engine Governor Company. The entire stock of raw and finished materials, special machinery and facilities for manufacture have been transferred to the Eisemann plant, and it is expected that but a slight interruption in production will occur. Both the well-known Simplex and Duplex models will be continued. Production is being organized and plans made for marketing a new developed mercury turbine governor very soon.

Okonite Company, Passaic, N. J., will open an office at 310 South Michigan Avenue, Chicago, on Feb. 1 and will take over the sale of Okonite products in the Western territory. Charles E. Brown, formerly vice-president of the Central Electric Co., has been appointed vice-president in charge of the territory west of Pittsburgh and east of the Rocky Mountains of the Okonite Company, with headquarters in Chicago. A. L. McNeill has been appointed manager of the railroad department. E. H.

McNeill and Ray N. Baker have been appointed sales engineers. L. R. Mann has been appointed manager of the St. Louis office.

Premier Equipment Corporation, Houston, Tex., is the successor company to the Houston Railway Car Company. The business of the new company will consist of locomotive and car repairing, buying and selling cars, locomotives, rails and industrial equipment. The general offices will be at Calhoun Avenue and Interurban Viaduct. P. R. Plumb is retiring from the Houston Railway Car Company. The new company is composed of L. A. Wiltshire, formerly of the Birmingham Rail & Locomotive Company, Birmingham, Ala.; O. D. Cleveland of the Equitable Equipment Company, New Orleans, La., and M. R. Ducey, Houston Railway Car Company, Houston, Tex.

Pure Carbon Company, Wellsville, N. Y., announces the appointment of H. H. Miller as its Pittsburgh representative, with office located at 7719 Lyman Street.

The Okonite-Callender Cable Company, Inc., has purchased a plant in Paterson, N. J., where it will manufacture lead-covered paper-insulated cables.

American Wood Preservers' Association will hold its twenty-first annual meeting at the Congress Hotel, Chicago, on Feb. 3, 4 and 5.

New Advertising Literature

Rail Welding & Bonding Company, Cleveland, Ohio, has issued bulletin No. 112, describing Una rod 300, a recent development of its laboratory for building up cupped rails.

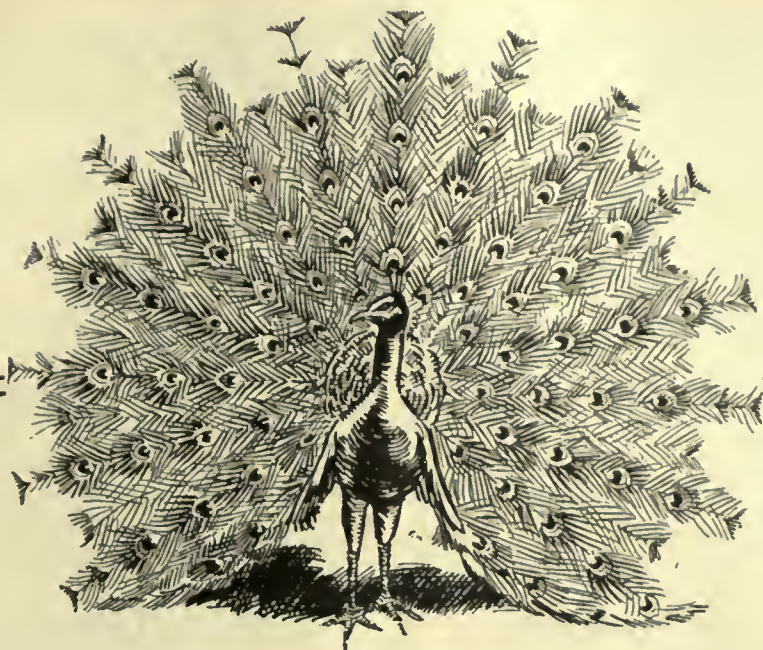
General Electric Company, Schenectady, N. Y., has issued a new 32-page bulletin, describing four improved types of oil circuit breakers. The bulletin contains illustrations and tables and covers details of construction, operation and characteristics.

Ohmer Fare Register Company, Dayton, Ohio, has issued a pamphlet entitled "The Human Factor," which describes the company's attitude on the human element as a factor in business.

Beaudry Company, Inc., Everett, Mass., has issued a descriptive circular of a new upright air hammer. This is furnished with rams weighing from 100 to 1,200 lb. All sizes are equipped with treadles and hand levers so that the hammers may be operated either by hand or foot.

Electric Machinery Manufacturing Company, Minneapolis, Minn., has issued bulletin No. 861 on electric power apparatus.

More-Jones Brass & Metal Company, St. Louis, Mo., has issued an attractively illustrated and handsomely bound souvenir volume in commemoration of the 50th anniversary of the founding of its business in 1874. In this book, containing some 70-odd pages, are outlined the features of its organization and products which have been developed over a period of half a century. Photographs of the many personalities who have been a part of the romance of the brass industry are reproduced within these pages.



ON GUARD! *for the emergency stop* **PEACOCK BRAKES**

A few swift turns of the hand-wheel and the sure grip of the Peacock Brake takes hold with maximum braking power—a retarding grip which is more effective than spinning wheels backward with reversed motors. That's what a hand-brake is for,—i.e. to stop the car as quickly as any other means, if some emergency renders the air brakes inoperative. But not every hand-brake will do it. Peacock Brakes are made to stop the car under emergency conditions—they are always "ON GUARD."



**The
Peacock
Staffless**

Peacock Staffless Brakes are especially adapted for the modern, light-weight safety car, both single and double-truck. Minimum platform space, light weight, high braking power.

NATIONAL BRAKE COMPANY, Inc.
890 Ellicott Square, BUFFALO, N. Y.

Bankers and Engineers

Ford, Bacon & Davis Incorporated Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation

Engineers—Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

EXAMINATIONS REPORTS APPRAISALS

ON

INDUSTRIAL AND PUBLIC SERVICE PROPERTIES

New York

Boston

Chicago

THE BEELER ORGANIZATION

ENGINEERS AND CONSULTANTS

Traction-Traffic-Equipment-Power

COORDINATION OF SERVICE—IMPROVED OPERATIONS

INCREASED TRAFFIC—FINANCIAL REPORTS

APPRAISALS—MANAGEMENT

52 Vanderbilt Ave.

New York City

SANDERSON & PORTER ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT and POWER PROPERTIES

CHICAGO

NEW YORK

SAN FRANCISCO

ENGELHARDT W. HOLST

Consulting Engineer

Appraisals, Reports, Rates, Service Investigation,
Studies on Financial and Physical Rehabilitation
Reorganization, Operation, Management

683 Atlantic Ave., Boston, Mass.

ALBERT S. RICHEY ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS—APPRAISALS—RATES—OPERATION—SERVICE

JOE R. ONG

Consulting Transportation Engineer

Specializing in Traffic Problems and in Methods to
Improve Service and Increase
Efficiency of Operation

PIQUA, OHIO

STEVENS & WOOD, INC.

Design and Construction of Power Stations

Railroad Electrification, Industrial Plants

REPORTS AND APPRAISALS

Management and Financing of Utilities and Industrials

Mahoning Bank Bldg.

120 Broadway

Youngstown, O.

New York

Dwight P. Robinson & Company

Incorporated

Design and Construction of

Electric Railways, Shops, Power Stations

125 East 46th Street, New York

Chicago

Youngstown

Atlanta

Philadelphia

Los Angeles

Montreal

Rio de Janeiro

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells

Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management Operation Construction

43 Cedar Street, New York City

DAY & ZIMMERMANN, INC.

ENGINEERS

DESIGN - CONSTRUCTION - REPORTS

VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly Pass—Differential Fares
Ride Selling

143 Crary Ave., Mt. Vernon, N. Y.

J. ROWLAND BIBBINS

Engineer—2301 Connecticut Ave., N.W., Washington, D. C.

TRANSPORTATION SURVEYS

Organized Traffic Relief and Transit Development

Co-ordinating Motor Transport, Railroad and City

Plans, Service, Routing, Valuation, Economic Studies

EXPERIENCE IN 20 CITIES

KELLY, COOKE & COMPANY

Engineers

49 BROADWAY
NEW YORK

424 CHESTNUT STREET
PHILADELPHIA

The Most Successful Men in the Electric Railway

Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

C. B. BUCHANAN
PresidentW. H. PRICE, JR.
Sec'y-Treas.JOHN F. LAYNG
Vice-President**BUCHANAN & LAYNG CORPORATION***Engineering and Management, Construction,
Financial Reports, Traffic Surveys
and Equipment Maintenance*BALTIMORE
825 Equitable Bldg.Phone:
Hanover 2142NEW YORK
49 Wall Street**JAMES E. ALLISON & CO.**

Consulting Engineers

Specializing in Utility Rate Cases and
Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.

**Bureau of Commercial Economics, Inc.
Industrial Engineers**Organization • Methods • Layout and Facilities
Public and Industrial Relations

72 West Adams Street • CHICAGO

HUMAN ENGINEERING*Railway Audit and Inspection Company, Inc.**Franklin Trust Building, Philadelphia*Boston
New OrleansNew York
Pittsburgh

BRANCHES

Baltimore
ChicagoAtlanta
St. LouisThe Most Successful Men in the Electric Railway
Industry read the**ELECTRIC RAILWAY JOURNAL**

Every Week

**Transmission Line and Special Crossing
Structures, Catenary Bridges**

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.

Engineers and Contractors

SYRACUSE, N. Y.

THE P. EDWARD WISH SERVICE50 Church St.
NEW YORKStreet Railway Inspection
DETECTIVES131 State St.
BOSTONWhen writing the advertiser for information or
prices, a mention of the Electric Railway
Journal would be appreciated.**Steinmetz**His spirit
and mind
live on
in books

The Superman and Wizard of Electrical Science is no longer in his laboratory at the G.E. works; but the results of his profound vision and persistent enthusiasm are at your disposal in his books and papers which have been well described as the very "cornerstone and foundation of modern electrical practice."

The foundation of electrical practice

Into these nine great books Dr. Steinmetz put practically all of the electrical knowledge that gained for him the name of "Electrical Wizard of Schenectady"—the electrical knowledge that takes you into the background of actual practice and points out the reasons for everything. The books are known all over the world. They are accepted as standard guides and authorities. Any electrical man who wishes to get further in electricity should see this great library and then keep it and use it.

See

**The great STEINMETZ LIBRARY
for 10 days FREE**

You may do this without the slightest obligation to buy. You should have this handsome set with its full treatment of the theory and special problems of electrical engineering at your command. The handbook and the practical treatise may give you the simple fact you need—but Steinmetz gives you the theory and its application—the real solution of the problem.

See it FREE—

No money down—

Small monthly
payments—You can examine the
STEINMETZ ELECTRICAL
ENGINEERING
LIBRARY for ten days
free. Simply fill in and
mail the coupon below.
This will not obligate you
to purchase. You merely
agree to return the books,
postpaid, in ten days, or
to remit \$4.00 in ten
days and \$4.00 per month
for eight months. Take
this opportunity to see
for yourself what these
books are and how useful
they could be to you.Send the coupon
today**McGraw-Hill
FREE EXAMINATION COUPON**

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York.

You may send me on approval for 10 days' free examination, the
STEINMETZ ELECTRICAL ENGINEERING LIBRARY. I agree to
return the books, postpaid in 10 days or to remit \$4.00 in 10 days
and \$4.00 per month for eight months.

Name

Address

Official Position

Name of Company

Subscriber to Electrical World?.....Mem. A.I.E.E.?.....

(Books sent on approval to retail purchasers in U. S. and Canada
only.)

E. 1-31-23



Collier Service

A nation-wide
organization
building and
sustaining car
card advertising
space values



Barron G. Collier, Inc.

Candler Bldg.
New York



St. Louis Built- *Ever-Wear* STEEL BODIES for Street Railways-

PIONEER experience in the building of every type of street railway car has enabled us to incorporate the practical advantages of spacious layout and quick passenger interchange with the luxury of the best automobile practice.

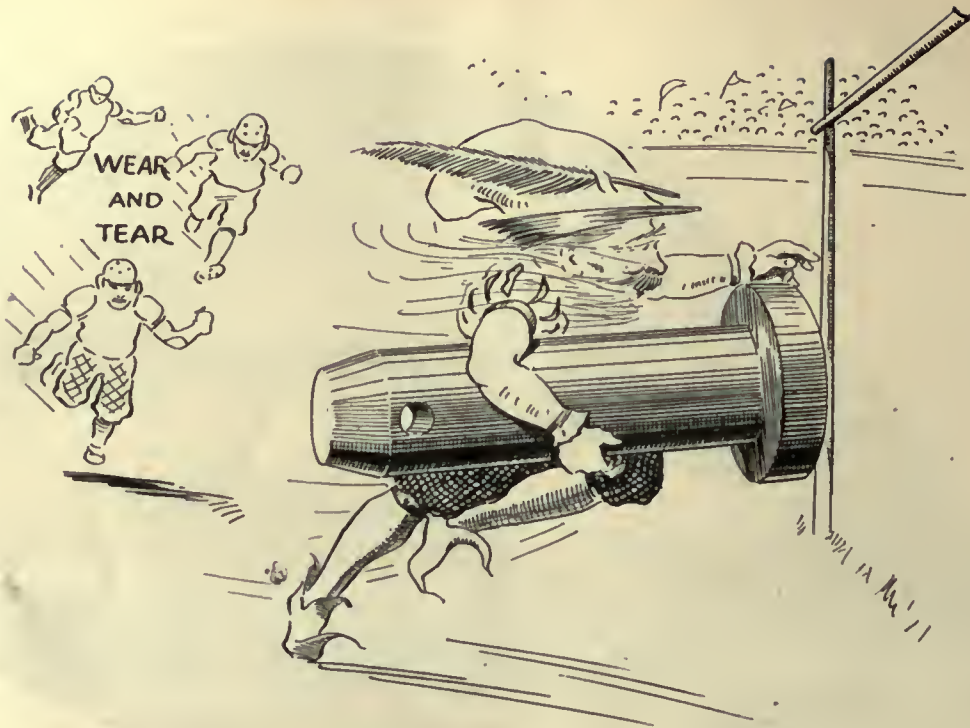
The illustrations show interior and exterior views of 29-passenger steel body recently built for the Houston Electric Company.

This "Ever-Wear" Steel body built in our quality shops will survive the chassis in normal service and it can be remounted when the original chassis is discarded.

In consulting us you are consulting manufacturers who are familiar with the best railway practice—exclusive builders for street railway companies.

Write today for further particulars and prices.

St. Louis Car Company
St. Louis, Mo.



They can't tackle this player before his long run is done!

Wear and tear, abuse and corrosion, these are the "tackle" on your opponent's team! Let Boyerized Parts play on your side. They are

trained by our special process to outwit the ravages of the gruelling service on electric railways, and reach the goal of longer life and lower cost.

BOYERIZED PARTS

Here's the list to choose from

Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Side Bearings
Spring Post Bushings

Spring Posts
Bolster and Transom
Chaffing Plates
Manganese Brake
Heads
Manganese Truck
Parts
Bushings
Bronze Bearings



Bemis Car Truck Company
Electric Railway Supplies
Springfield, Mass.

Representatives:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Oregon
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.



Modernize—Miller-ize *city cars too !*

Remember—

1. Less wire wear.
2. More mileage.
3. No dewirements.
4. Silent operation.
5. Steady current delivery.

Nearly all the important interurban lines have found an end to trolley troubles in the smooth-running wire-hugging, big capacity, 3-inch contact surface of Miller Trolley Shoes.

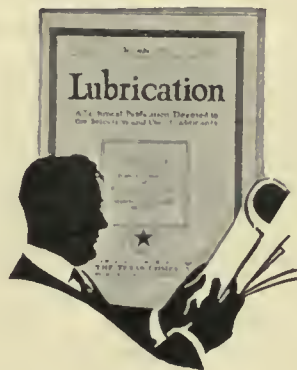
And if fast interurbans need the security of a trolley shoe that hugs the wire as no wheel ever could, that gives more mileage, that wears the wire less, and that delivers all the current the motors can demand, city cars need it equally as much. For city service involves constant stopping and starting, sharp curves, switches, intersections, . . . and wire breaks mean costly traffic tie-ups.

Remember too, Miller Trolley Shoes present no backing up problem. The design and construction of the shoe itself ensures equally smooth running in either direction. Make the Miller Shoe test yourself.

Miller Trolley Shoe Co.
Boston-21, Mass.



MILLER TROLLEY SHOES



The Year's "Best Seller" IN ONE VOLUME

Exclusively for the Electric Street Railway Field

Picture one small volume—less than one score pages—in which are condensed *all* the vital facts you ought to know on a very important subject. A volume with clear interesting illustrations of every dominant point.

Such a volume is the February issue of "Lubrication," The Texas Company's publication. This issue is devoted "exclusively to the Electric Street Railway Field." In it are discussed these subjects:

- | | |
|---|--|
| 1. The Five Chief Lubricants required by Electric Street Railways. | 5. Specific Recommendations to eliminate waste and promote efficiency. |
| 2. Other lubricants to meet special conditions. | 6. Methods of Reclaiming. |
| 3. A comparison of different lubricating methods in the Street Railway Field. | 7. Methods of Handling and Storing Lubricants. |
| 4. The faulty economics of the Guaranteed Contract. | 8. And other helpful discussion. |

*The Idea is: Make sure to get your copy of
February "Lubrication"*

Coupon



THE TEXAS COMPANY, U. S. A.

Texaco Petroleum Products

Dept. RJ, 17 Battery Place, New York City



Please send me FREE the February, 1925, issue of your magazine "Lubrication" containing the article on "Lubrication in the Street Railway Industry."

Name City
Street State



Tune in on a wave length
of 100% satisfaction!

This is station CCH, the Consolidated Car Heating Company, broadcasting our regular weekly program direct from our factory at Albany.

Tilting Heat Deflectors for Car Comfort

USED in combination with Consolidated Cross Seat Heaters, the Consolidated Tilting Heat Deflector assures a unit of maximum heating comfort, appreciated by passengers.

The heated air follows the angle of the deflector to the back of the seat where it has a free escape. Heat cannot pocket and seat cannot become overheated.

Consolidated engineers have provided for automatically reversing the inclination of the deflector by the movement of the

seat. Light and rust-proof, Consolidated Deflectors are made for either single or double coil heaters in varying lengths. This tilting deflector is merely another example of the advanced thinking of the engineers who have linked with electric car heating the success of the open coil principle and thermostat control.

Station CCH now signing off until this time next week.

Good day!

HEAT DEFLECTORS



CONSOLIDATED CAR HEATING COMPANY
ALBANY, N. Y.

New York

Chicago

Nothing but NUTTALL GEARS

to meet current gear renewals

It is neither difficult nor expensive to standardize on Nuttall BP Helical Gears. As fast as those old untreated spur gears wear out, replace them with sets of Helicals. Thereafter replacements will be few and far between for BP Helicals are guaranteed to last at least four times as long. Experience has proved it.

Order Helicals

R.D. NUTTALL COMPANY
PITTSBURGH  PENNSYLVANIA

All Westinghouse Electric and Mfg. Co. District Offices are Sales Representatives in the United States for Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.



Is Money Ever "Spent"

for Advertising?

A young and energetic executive took hold of a fine old business in New York.

"What this business needs," he told himself, "is a place in the mind of the public."

And deliberately he set out to sacrifice the greater volume of his profits and invest the sacrifice into the building of good will.

He did. And to this old business, advertising was the breath of life.

For six months had not passed before the business had grown so that the

advertising cost was a smaller percentage than ever it had been, and, because of a larger volume, the shop effected economies and gave far superior service.

That was five years ago. Today a certain percentage is spent, or supposed to be spent, for advertising. But as fast as the appropriation is spent, the more the business increases; and the more that the business increases, the smaller the percentage becomes.

Is money ever "spent" for advertising?

Modern Traffic Calls for the Most Modern Track Foundation

Heavy trucking upon city streets makes it necessary to have a paving foundation that will withstand the concentrated traffic shocks. Service records prove that in paved streets, concrete makes the most durable track foundation.

Provided the concrete is cushioned in some way from the traffic shocks which, if permitted to reach it, will disintegrate it. The logical place for the cushion is in the tie.

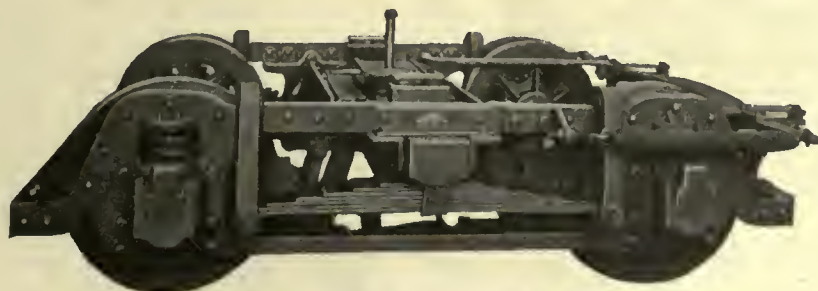
You have the solution of this problem in the Dayton Resilient Tie. That and concrete constitute the most modern track foundation.

THE DAYTON MECHANICAL TIE CO.

707 Commercial Building, Dayton, Ohio

DAYTON *Resilient* TIE

Simplicity, Strength and Perfect Riding Qualities Characterize Baldwin Electric Motor Trucks



Baldwin Motor Truck, Class "R," with "Inside Hung" Motors

ON a number of the electric railways in Japan, both in city and suburban service, Baldwin Improved Electric Motor Trucks have given the most satisfactory results. We will forward any information desired for trucks to meet your requirements.

THE BALDWIN LOCOMOTIVE WORKS

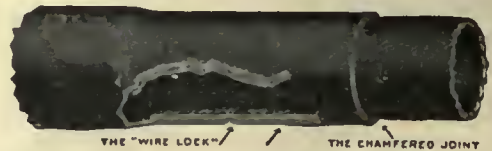
PHILADELPHIA, U. S. A.

Cable Address, "Baldwin, Philadelphia"



Reg. U. S. Pat. Office

Incandescent Lamp Cord

AMELECTRIC PRODUCTS**BARE COPPER WIRE AND CABLE****TROLLEY WIRE****WEATHERPROOF WIRE
AND CABLE****PAPER INSULATED
UNDERGROUND CABLE****MAGNET WIRE****AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.**Boston, 176 Federal; Chicago, 112 W. Adams;
Cincinnati, Traction Bldg.; New York, 166 E. 43rd St.**ELRECO TUBULAR POLES****COMBINE****Lowest Cost****Least Maintenance****Lightest Weight****Greatest Adaptability**

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO

New York City, 30 Church Street

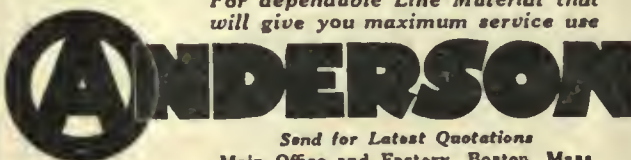
THE WORLD'S STANDARD**"IRVINGTON"**

Black and Yellow

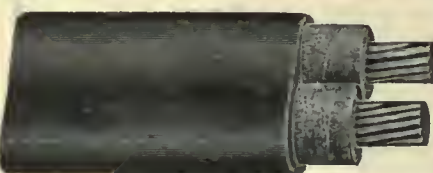
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds**Irvington Varnish & Insulator Co.**
Irvington, N. J.*Sales Representatives in the Principal Cities***We are prepared**to handle any high grade proposition where
VARNISHED CAMBRIC
Wires and Cables
are required.When using quality Wires and Cables use quality Tapes.
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes.**THE OKONITE CO., Passaic, N. J.**
Incorporated 1884Sole Office: New York—Atlantic—
Pittsburgh—San Francisco.
Agents: Central Electric Co., Chicago,
Ill.; Pettigall-Andrews Co., Boston,
Mass.; The F. D. Lawrence Electric
Co., Cincinnati, Ohio; Novelty Elec-
tric Co., Philadelphia, Pa.
Canadian Representatives: Engineering
Materials Limited, Montreal.

TRADE



MARK

For dependable Line Material that
will give you maximum service useSend for Latest Quotations
Main Office and Factory, Boston, Mass.**Chapman**
Automatic Signals
Charles N. Wood Co., Boston**Standard
Underground
Cable Co.**General Offices
Pittsburgh, Pa.
Branches in all
Principal cities**ELECTRICAL WIRES AND CABLES****John A. Roebling's Sons Company**
Trenton, New Jersey J-1707**HUBBARD TURNBUCKLES**Made in three
types, Eye and Eye,
Eye and Hook and
Eye and Clavis.Double-Dip Has
Galvanized the
Hubbard Way.

Type B, Eye and Hook

HUBBARD & COMPANY
PITTSBURGH CHICAGO**AUTOMATIC SIGNALS**
Highway Crossing Bells
Headway Recorders
Flasher Relays**NACHOD SIGNAL COMPANY, INC.**
LOUISVILLE, KENTUCKY.**ANACONDA**
TROLLEY WIREANACONDA COPPER
MINING COMPANY
Conway, Buildex, Chicago, Ill.THE AMERICAN
BRASS COMPANY
General Offices, Waterbury, Conn.



Special Track Work of every
description

THE BUDA COMPANY
Harvey (Suburb) Illinois

SPECIALISTS

in the

Design and Manufacture
of

Standard—Insulated—and
Compromise Rail Joints

The Rail Joint Company
61 Broadway, New York City

Arc Weld Rail Bonds

AND ALL OTHER TYPES

Descriptive Catalogue Furnished

American Steel & Wire Company

Chicago
New York
Boston
Cleveland
Pittsburgh
Denver

U. S. Steel Products Co.
San Francisco

Los Angeles

Portland

Seattle

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE
CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY
Johnstown, Pa.

Sales Offices:

Atlanta Chicago Cleveland New York
Philadelphia Pittsburgh

Pacific Coast Representatives:

United States Steel Products Company
Los Angeles Portland San Francisco Seattle

Export Representatives:

United States Steel Products Company, New York, N. Y.

ACME WIRE

—PRODUCTS—

"Cottonite"—A high-dielectric, enameled, cotton-covered magnet wire. Prevents short circuits in armatures due to moisture.

ACME MAGNET WIRE

"Enamelite"—Plain enameled copper wire

"Cottonite"—Cotton-covered "Enamelite"

"Silkenite"—Silk-covered "Enamelite"

Magnet Wire—Cotton or silk, single or double

ACME COIL WINDINGS

Field Coils, Meter Coils, Ignition Coils, Windings for Audio and Radio Frequency Transformers.

ACME VARNISHED INSULATIONS

Varnished Cambrics—

Black and yellow

Varnished Silks and Tapes—

For every requirement

Varnished Papers—

Black and yellow

Varnished Tubing—

"Spaghetti", all sizes, 5 colors

"Celatsite" Wire—

Tinned, spaghetti-covered wire

for radio sets; 5 colors

Insulating Varnishes

Catalog sent Engineers and Executives

THE ACME WIRE COMPANY

Main Office and Plant, New Haven, Conn.

New York Cleveland Chicago
52 Vanderbilt Ave. Guardian Building 53 W. Jackson Blvd.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of
Water Tube Boilers
of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building



WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAYANA, CUBA, Calle de Aguilar 104
SAN JUAN, PORTO RICO, Royal Bank Building

'CARNEGIE'
for
**WHEELS
AXLES
RAILS
CROSS TIES**



Carnegie Steel Company
PITTSBURGH, PENNA.

"Longwear" Pins and Bushings
Hard—Accurate—Uniform



Renewal Materials
for Peckham and
other Trucks

Castings—Forgings
Springs

E.G. Long Company

50 Church Street, New York, N. Y.

GODWIN Steel Paving Guards

*Adapted to all
types of rails
and paving*



Proven by service
to economically
prevent seepage
and disintegration
of street railway
paving.

Write for Illustrated Catalog No. 20.

W. S. GODWIN CO., Inc.
RACE & McCOMAS STS., BALTIMORE, MD.

Cambria Forged Steel Electric Car Axles

To Meet Most Rigid Specifications



Other products for the electrical field includes wheels, armature shafts, rails, spikes, track work, splice bars, bolts, tie plates, tie rods, pole line material, sheats, magnet steel and gear blanks.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

BETHLEHEM

ALLIS-CHALMERS
MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines.
Condensers, Gas and Oil Engines, Air Compressors,
Air Brakes



**U. S. ELECTRIC
AUTOMATIC SIGNAL**

for single track block signal protection

United States Electric Signal Co.

West Newton, Mass.

ECONOMIZERS

reduce fuel costs by making
use of waste exhaust gases
to preheat the boiler feed.
Patented construction proven
by 20 years of service.

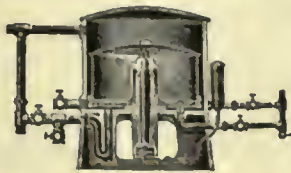
FOSTER

SUPERHEATERS

improve engine, turbine and
boiler economy by enabling a
given amount of steam to do
more work. Over 10,000 in-
stallations in stationary power
plants.

POWER SPECIALTY CO., Boston, Phila., Pitta., Detroit, Kans. City, Chicago,
San Fran., Los Angeles, Boulder, Dallas, London 111 Broadway, NEW YORK

Turbine driven Reclaiming Machine *saves* Oil and Wiping Waste



The Oil & Waste Saving Machine Co.

1509 Real Estate Trust Bldg., Philadelphia, Pa.
Dept. D.

Play for safety—
*plus resiliency—
plus long life*

By specifying

FORT PITT SPRINGS

FORT PITT SPRING &
MFG. CO.
Pittsburgh, Pa.



SEVEN WORKS
RAMAPO-AJAX-ELLIOT

HILLBURN, NEW YORK
NIAGARA FALLS, N.Y.
CHICAGO, ILLINOIS
EAST PELOUSE, ILL.
PUEBLO, COLORADO
SOUTH BEND, INDIANA
NIAGARA FALLS, ONT.
KANSAS



Ramapo Ajax Corporation

RAMAPO AUTOMATIC
RETURN SWITCH STANDS
FOR PASSING SIDINGS
TEE RAIL SPECIAL WORK
MANGANESE CONSTRUCTION
SALES OFFICES AT ALL WORKS
Main Office, HILLBURN, N.Y.



Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

PROVIDENCE H-B FENDERS LIFE GUARDS

The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

HORNE & EBLING CORPORATION

50 CHURCH ST.,

NEW YORK, N. Y.

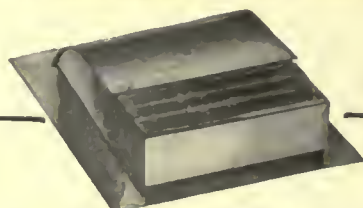
Brass Hardware
For Cars and Buses

Motor and Controller
Parts



Sterling Trolley Bases
and Brakes

Mall. Iron and Brass
Castings



N-L Type "C" Arch Roof
Ventilator

"Give'em the Air"

If you don't give your passengers air they may take the air—and ride with the other fellow next time.

N-L Ventilators solve the problem by furnishing perfect ventilation, without drafts or dust or rain or snow. Many changes of air every hour.

What it means to you—in "Superior Ventilation," sent on request.

The Nichols-Lintern Co.

7960 Lorain Ave., Cleveland Ohio

Canadian Representative:
Railway & Power Eng. Corp., Ltd.,
133 Eastern Ave., Toronto, Ont.



ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed.
Up-to-date and economical.

Alumino-Thermic Corp., Roselle Park, N. J.

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

RAILWAY UTILITY COMPANY

CAR COMFORT WITH
UTILITY

HEATERS
REGULATORS
VENTILATORS

141-151 West 22d St.
Chicago, Ill.

Write for
Catalogue

1328 Broadway
New York, N. Y.

NEW and RELAYING RAILS

1 TON or 1000

TRACK
EQUIP-
MENT

L.B. FOSTER CO.

PITTSBURGH - PENNSYLVANIA

RAIL
ACCESS-
ORIES

NEW YORK - JERSEY CITY - PHILADELPHIA - HAMILTON, O.



Type R-11
Double Register

International Registers

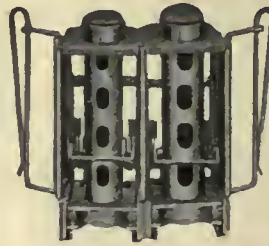
Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for
HEEREN ENAMEL BADGES.

The International Register Co.

15 South Throop Street, Chicago, Illinois

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.



The Zone System of Fares
is Successfully Collected
with the Aid of

CLEVELAND FARE BOXES

Let Us Give You Particulars

The Cleveland Fare Box Co.
Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd.,
Preston, Ont.

Coin Counting and Sorting Machines. Change Carriers

B. A. HEGEMAN, Jr., President
H. A. HEGEMAN, Vice-Pres. and Treas.
W. C. PETERS, Manager Sales and Engineering

C. C. CASTLE, First Vice-President
F. T. SARGENT, Secretary

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and
Change Maker
The Aluminum Field Coils
Walter Tractor Snow Plows
Cutler-Hammer Electric
Heaters
Pittsburgh Forge & Iron
Co.'s Products
Genesco Paint Oils
E. Z. Car Control Corpora-
tion's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s
Single and Double Deck
Bases

Economy Electric Devices
Co.'s Power Saving and
Inspection Meters
Anglo-American Varnish Co.
Varnishes, Enamels, etc.
Gilmer Multiple Safety Sten-
Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co.,
Springs
Turnstile Car Corporation's
Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

HASKELITE

roofs and headlinings save hundreds of pounds
in weight and reduce operating costs

HASKELITE MANUFACTURING CORPORATION
133 W. Washington St., Chicago, Ill.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. 07.

Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.



Gets Every Fare PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and
Street Cars

Perey Manufacturing Co., Inc.
101 Park Avenue, New York City



Electrical Insulation and Headlinings
THE PANELYTE COMPANY, Trenton, N. J.

100 New Users in the Last Nine Months KASS SAFETY TREADS

HIGH
in efficiency and lasting qualities
LOW

in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago

HALE-KILBURN CAR SEATS

For Every Class of Service

General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No.
478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD.

Positions Wanted, 4 cents a word, minimum 15 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 5 cents a word, minimum charge \$2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH

1 to 3 inches..... \$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch
Rates for larger space, or yearly rates, on request.
In advertising such is measured vertically on one column, 3 columns 30 inches 4 1/2 page

E.F.J.

POSITIONS VACANT

SPECIAL track work draftsmen wanted preference given men having had experience with special track work manufacturer, but will consider one or two junior draftsmen familiar with trigonometry. State age, experience and salary in first letter. P-774, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

EXPERIENCED traffic superintendent wanted, to maintain schedules and take supervision of inspectors. P-775, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

GOOD track man wants job. All experience has been with electric railways. Newt Smith, Little River, Texas.

MASTER mechanic, with broad experience and successful record backed by prominent executives in railway field, desires change. PW-769, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT of equipment thoroughly experienced and successful in the efficient maintenance of auto buses, city and interurban cars, desires to change. Confidential interview solicited. PW-771, Electric Railway Journal, 10th Ave. at 36th St., New York.

WANTED

USED PORTABLE SUB-STATION

Will buy or rent one used portable substation, 500 to 1000 kw.-600-v.D.C. output, complete with control equipment, car and accessories. Rotary converter preferred. Also transformers for use with above, to be used with 4600 or 23000-60-cy. primaries.

Bidders to submit proposal to

L. R. WAGNER, E.E.

Department of Street Railways, St. Jean and Shoemaker Aves., Detroit, Michigan

WANTED TO BUY

Scrap and Relaying Rails, Trolley and Feed Wire

We are interested in buying: Entire Trolley Roads and Power Plants for Dismantling Purposes.

THE S. SNYDER CORPORATION

14 to 21 Mart Place, Rochester, N. Y.
N. Y. Office—721 Knickerbocker Bldg.

WE WANT TO BUY

30—West. 308-C.V.-4

MOTORS

Have you any to offer?

ELECTRIC EQUIPMENT CO.

Commonwealth Bldg., Philadelphia, Pa.

1200 Tons 70 lb. ASCE

Relaying Rails

Strictly First Class
With Angle Bars

ZELNICKER IN ST. LOUIS

Cars—Locomotives—Hoists—Etc.

FOR SALE: The following gears can be disposed of for immediate delivery:

Type	Teeth	Bore	Solid or Split	No. Gears
GE-70 and 80.....	71	5.485"	solid	124
GE-70 and 80.....	71	5.500"	split	20
GE-1000.....	67	4.870"	solid	9
GE-1000.....	67	4.500"	split	2
GE-1000.....	67	4.000"	split	2
GE- 800.....	69	4.000"	split	1
GE- 74.....	67	6.000"	split	9

If interested, please communicate with

The Milwaukee Electric Railway & Light Company

Purchasing Agent

Public Service Building, Milwaukee, Wisconsin

FOR SALE

Used Seat Cushions, Seat Backs and Frames

If interested detailed information will be furnished.

Purchasing Agent

KANSAS CITY RAILWAYS CO.

Kansas City, Mo.

FOR SALE

12 G. E. 264A MOTORS

TRANSIT EQUIPMENT COMPANY

Cars—Motors

501 Fifth Avenue, New York

Relaying Rails

NEW RAILS—ACCESSORIES

Buy Guaranteed
Relaying Rails
and Save 30%
to 50%

1 Ton or 1000

LBFOSTERCO

PITTSBURGH PA NEW YORK CITY
JERSEY CITY - PHILADELPHIA - HAMILTON

SOME ONE WANTS TO BUY

the equipment or machinery that you are not using.

This may be occupying valuable space, collecting dust, rust and hard knocks, in your shops and yards.

SELL IT BEFORE DEPRECIATION SCRAPS IT

THE SEARCHLIGHT SECTION
IS HELPING OTHERS

—LET IT HELP YOU ALSO



Cold Dinners

for *your* passengers?

Not if you use

AJAX

BABBITT for ARMATURES

keeps the rolling stock rolling



The Ajax Metal Company

Established 1880

PHILADELPHIA

NEW YORK

CHICAGO

BOSTON

CLEVELAND

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

W. J. Jeandron

345 Madison Avenue, New York

Pittsburgh Office: 634 Wabash Bldg.

Chicago Office: 1657 Monadnock Block

San Francisco Office: 525 Market Street

Canadian Distributors: Lyman Tube & Supply Co., Ltd.,
Montreal and Toronto

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS

KALAMAZOO, MICH., U. S. A.

BRAKE SHOES

AERA Standards
Brake Heads



Diamond "S" Steel Back and Lug Shoes
best for all equipment.

Manufactured and sold under U. S.
Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York

332 So. Michigan Ave., Chicago



We make a specialty of
**ELECTRIC RAILWAY
LUBRICATION**

We solicit a test of TULC
on your equipment

The Universal Lubricating Co.
Cleveland, Ohio

Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Jacks (See also Cranes, Holste and Lifts)
Buda Company
Elec. Service Supplies Co.

Joints, Rail
(See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
Fort Pitt Steel Castings Co.

Junction Boxes
Horne & Ebling Corp.
Std. Underground Cable Co.

Lamps, Guards and Fixtures
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc and Incandescent
(See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Nichols-Lintern Co.
Ohio Brass Co.

Lanterns, Classification
Nichols-Lintern Co.

Lightning Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locking Spring Boxes
Wm. Wharton, Jr., & Co., Inc.

Locomotives, Electric
Baldwin Locomotive Wks.
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Lubricating Engineers
Galena Signal Oil Co.
Texas Co.
Universal Lubricating Co.

Lubricants, Oil and Grease
Galena Signal Oil Co.
Texas Co.
Universal Lubricating Co.

Manganese Parts
Bemis Car Truck Co.

Manganese Steel Castings
Wm. Wharton, Jr. & Co.

Manganese Steel Guards
Rampax Ajax Corp.

Manganese Steel, Special Track Work
Bethlehem Steel Co.
Wm. Wharton, Jr., & Co., Inc.

Manganese Steel Switches
Frogs & Crossings
Bethlehem Steel Co.
Rampax Ajax Corp.

Meters (See Instruments)

Molding, Metal
Allis-Chalmers Mfg. Co.

Motor Buses (See Buses, Motor)

Motors, Electric
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

Motors and Generators, Sets
Allis-Chalmers Mfg. Co.
General Electric Co.

Motormen's Seats
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

Nuts and Bolts
Bemis Car Truck Co.
Bethlehem Steel Co.
Hubbard & Co.

Oil Heaters
Power Specialty Co.

Oils (See Lubricants), Omnibuses (See Buses, Motor)

Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)

Packing
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Paints and Varnishes (Insulating)
Irvington Varnish & Ins. Co.

Paints and Varnishes for Woodwork
National Ry. Appliance Co.

Pavement Breakers
Ingersoll Rand Co.

Paving Guards, Steel
W. S. Godwin Co., Inc.

Paving Material
Amer. Br. Shoe & Fdy. Co.

Pickup, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.

Pipe Fittings
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Rampax Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Sup. Co.

Pole Line Hardware
Bethlehem Steel Co.
Ohio Brass Co.

Poles, Metal Street
Elec. Ry. Equipment Co.
Hubbard & Co.

Pole Reinforcing
Hubbard & Co.

Poles & Ties Treated
Bell Lumber Co.
International Crossting & Construction Co.

Poles, Ties, Posts, Piling & Lumber
Bell Lumber Co.
International Crossting & Construction Co.

Poles, Trolley
Bell Lumber Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.

Portable Gladders
Buda Company

Potholes
Okonite Co.

Power Saving Devices
National Ry. Appliance Co.
Railway Improvement Co.

Pressure Regulators
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Pumps
Allis-Chalmers Mfg. Co.

Pumps Vaccum
Ingersoll Rand Co.

Punches, Ticket
Intern'l Register Co., The
Wood Co., Chas. N.

Rail Braces & Fastenings
Rampax Ajax Corp.

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.
Rail Joint Co.

Rail Joints—Welded
Lorain Steel Co.

Rails, Relaying
Foster Co., L. B.
Hyman-Michaels Co.

Rails, Steel
Bethlehem Steel Co.
Carnegie Steel Co.
Foster Co., L. B.

Railway Paving Guards, Steel
Godwin Co., Inc., W. S.

Railway Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Rail Welding
Railway Trackwork Co.

Rattan
Brill Co., The J. G.
Elec. Service Supplies Co.
McGuire-Cummings Mfg. Co.

Reclaimers, Waste & Oil
Oil & Waste Saving Machine Co.

Registers and Fittings
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Rooke Automatic Register Co.

Reinforcement, Concrete
Amer. Steel & Wire Co.

Repair Shop Appliances (See also Coll Banding and Winding Machines)
Elec. Service Supplies Co.

Repair Work (See also Coils)
General Electric Co.
Westinghouse E. & M. Co.

Replacers, Car
Elec. Service Sup. Co.

Resistances
Consolidated Car Heat. Co.

Resistance, Wire and Tube
General Electric Co.
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Westinghouse E. & M. Co.

Roofing Car
Pantacote Co., Inc.

Roofs
Haskelite Mfg. Co.

Sanders, Track
Brill Co., The J. G.
Elec. Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.

Sash Fixtures, Car
Brill Co., The J. G.
Horne & Ebling Corp.

Serapers, Track (See Cleaners and Serapers, Track)

Screw Drivers, Rubber Insulated
Elec. Service Sup. Co.

Seals, Bus
Brill Co., J. G., The
Heywood-Wakefield Co.
St. Louis Car Co.

Seals, Car (See also Rattan)
Brill Co., The J. G.
Heywood-Wakefield Co.
St. Louis Car Co.

Sealing Materials
Brill Co., J. G.
Heywood-Wakefield Co.

Second Hand Equipment
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

Shades, Vestibule
Brill Co., The J. G.

Shovels
Brill Co., The J. G.
Hubbard & Co.

Side Bearings (See Bearings, Center and Side)

Signals, Car Starting
Consolidated Car Heat. Co.
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.

Signals, Indicating
Nichols-Lintern Co.

Signal Systems, Highway Crossing
Nashod Signal Co., Inc.
U. S. Electric Signal Co.
Wood Co., Chas. N.

Signal Systems, Block
Elec. Service Sup. Co.
Nashod Signal Co., Inc.
U. S. Electric Signal Co.

Slack Adjusters (See Brake Adjusters)

Sleeve Wheels and Cutters
Anderson Mfg. Co., A. & J. M.

Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.

St. Louis Car Co.
Nuttall Co., R. D.

Smokestacks, Car
Nichols-Lintern Co.

Sockets & Receptacles
National Metal Molding Co.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Consolidated Car Fender Co.
McGuire-Cummings Mfg. Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)
Irvington Varnish & Ins. Co.

Solderless, Connector
Frankel Connector Co.

Special Adhesive Papers
Irvington Varnish & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co.

Spikes
Amer. Steel & Wire Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs, Car and Truck
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
St. Louis Car Co.

Sprinklers, Track and Road
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.

Steel Castings
Wm. Wharton, Jr., & Co., Inc.

Steel and Steel Products
Carnegie Steel Co.

Steps, Car
Brill Co., J. G., The
Morton Mfg. Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Stop Signals
Nichols-Lintern Co.

Storage Batteries (See Batteries, Storage)

Strain, Insulators
Anderson, A. & J. M. Mfg. Co.
Ohio Brass Co.

Strand
Roebbling's Sons Co., J. A.

Superheaters
Babcock & Wilcox Co.
Power Specialty Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switches, Safety
Johns-Tratt Co.

Switches, Selector
Nichols-Lintern Co.

Switches, Tee Rail
Rampax Ajax Corp.

Switches, Track (See Track Special Work)

Switches and Switchboards
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Timbers, Tie
Railway Trackwork Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Bethlehem Steel Co.
Rampax Ajax Corp.

Telephones and Parts
Elec. Service Supplies Co.

Terminals, Cable
Std. Underground Cable Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermistats
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers & Destroyers
Elec. Service Supplies Co.

Ties, Mechanical
Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel
Carnegie Steel Co.
W. S. Godwin Co., Inc.
International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tongue Switches
Wm. Wharton, Jr., & Co., Inc.

Tool Steel
Bethlehem Steel Co.

Tools, Track & Miscellaneous
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Hubbard & Co.
Railway Trackwork Co.

Torches, Acetylene (See Cutting Apparatus)

Towers and Transmission Structures
Archbold-Brady Co.
Westinghouse E. & M. Co.

Trackless Trolley Cars
Brill Co., J. G., The
St. Louis Car Co.

Track Expansion Joints
Wm. Wharton, Jr., & Co., Inc.

Track Grinders
Railway Trackwork Co.

Track, Special Work
Bethlehem Steel Co.
Buda Company
N. Y. Switch & Crossing Co.

Rampax Ajax Corp.
Wm. Wharton, Jr., & Co., Inc.

Transfer (See Tickets)

Transfer Tables
American Bridge Co.

Transformers
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Treads, Safety, Stair, Car Step
Morton Mfg. Co.

Trolley Bases
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Trolley Material, Overhead
Anderson, A. & J. M. Mfg. Co.

Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.

Tralley Shoe
Miller Trolley Shoe Co.

Trolley Wheel Bushings
More-Jones Brass & Metal Co.

Trolley Wheels & Hubs
More-Jones Brass & Metal Co.

Thornion Trolley Wheel Co.

Trolley Wheels (See Wheels, Trolley)

Trolley Wire
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebbling's Sons Co., J. A.

Trucks, Car
Baldwin Locomotive Wks.
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.

St. Louis Car Co.
Taylor Elec. Truck Co.

Trubing, Yellow & Black
Flexible Varnish
Irvington Varnish & Ins. Co.

Turbines, Steam
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Turbines, Water
Allis-Chalmers Mfg. Co.

Turnstiles
Elec. Service Supplies Co.
Percy Mfg. Co., Inc.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Varnished Papers & Silks
Acme Wire Co.
Irvington Varnish & Ins. Co.

Ventilators, Car
Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

Welded Rail Joints
Alumino-Thermic Corp.
Ohio Brass Co.
Railway Trackwork Co.

Welders, Portable Electric
Ohio Brass Co.
Railway Trackwork Co.

Welding Processes and Apparatus
Alumino-Thermic Corp.
General Electric Co.
International Oxygen Co.
Ohio Brass Co.
Railway Trackwork Co.
Westinghouse E. & M. Co.

Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools)

Wheels, Car, Cast Iron
Bemis Car Truck Co.
Carnegie Steel Co.

Wheels, Wrought Steel
Carnegie Steel Co.

Wheels, Trolley
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.

Nuttall Co., R. D.
Star Brass Works.

Whistles, Air
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Wire Rope
Roebbling's Sons Co., J. A.

Wires and Cables
Acme Wire Co.
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Roebbling's Sons Co., J. A.
Westinghouse E. & M. Co.
Std. Underground Cable Co.

"Tool Steel"

HELICALS

are just as superior
in quality as
"Tool Steel"

STU RS.

Tool Steel Quality

The Tool Steel
Gear and Pinion Co.
CINCINNATI, O.

Helical gears licensed under patent May 30th, 1923



"Differential Two-Car Train. Trailer dumping load clear of trench."

DIFFERENTIAL CARS

Standard on Fifty Railways for

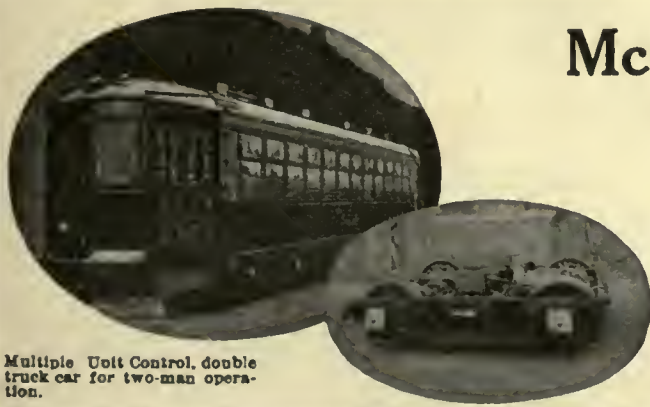
Track Maintenance	Track Construction
Ash Disposal	Hauling Crossties
Placing Ballast	Disposal of Waste
Coal Hauling	Snow Disposal
Concrete Materials to the Job	
Excavated Material to the Dump	

For Economy

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION
CAR-WHEEL TRUCK and TRACTOR

THE DIFFERENTIAL STEEL CAR CO.

Findlay, Ohio, U. S. A.



Multiple Volt Control, double truck car for two-man operation.

McGUIRE-CUMMINGS

Manufacturing Company

General Offices

111 W. Monroe St., Chicago, Ill.

Street Cars, Trucks Snow Sweepers

V-K

OILLESS TROLLEY
WHEEL and
NON ARCING HARP

"PERFECT LUBRICATION PLUS
MAXIMUM CONDUCTIVITY"

More-Jones Brass & Metal Co.
ST. LOUIS MISSOURI

Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

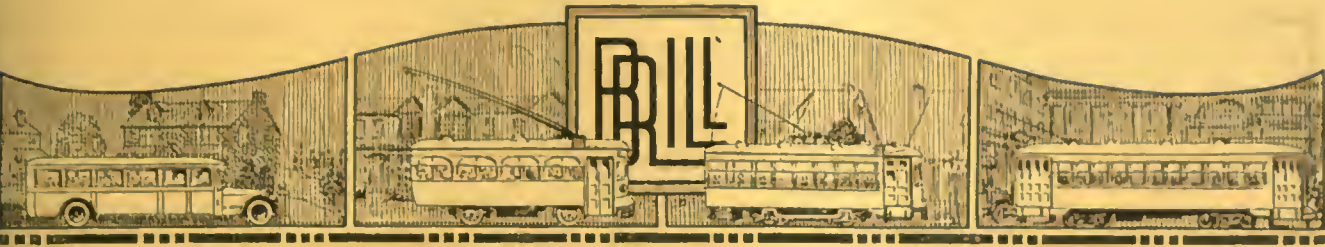
FOR POSITIVE SATISFACTION ORDER
SILVER LAKE

If you are not familiar with the quality you will be surprised at its **ENDURANCE** and **ECONOMY**.

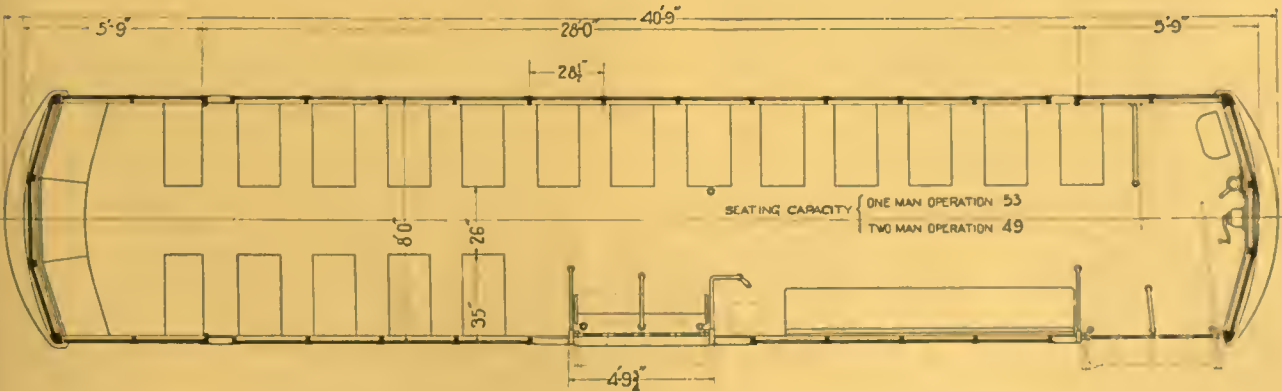
Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY

Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts



Shreveport's All-Service Cars



This type car, recently furnished the Shreveport Railways Company by the American Car Company, has distinctive features which particularly adapt it to all kinds of service.


While light in weight and arranged for one-man operation, it is also equipped with double

front-entrance and center-exit doors to facilitate quick passenger interchange in heavy traffic.

Equipped with quadruple 25 hp. motors and mounted on Brill 77-E Low-level trucks, it weighs 30,090 lb. complete.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WAGON MANFG CO.
ST. LOUIS, MO. — CLEVELAND, OHIO — SPRINGFIELD, MASS.





KEEPING your equipment physically fit—*maintenance*—means keeping it most fit for profits.

You should *maintain* your equipment with duplicate parts—built by the equipment manufacturer—and thereby insure against the high cost of repeated pull-ins.

You should *modernize* existing equipment by installing wherever possible new devices that are designed to give better service at a lower maintenance cost.

GENERAL ELECTRIC

Schenectady, N. Y.



540-25



ELECTRIC RAILWAY JOURNAL



HOUSTON PUBLIC LIBRARY
LYCEUM AND CARNEGIE E
HOUSTON, TEXAS.

In city service—

—where sharp curves, switches and crossings abound, where one-man cars are being operated, and where headways are short, progressive electric railways are turning more and more to smooth running, wire hugging, long wearing, 3 in. contact Miller Trolley Shoes.

Experience has proved that they practically eliminate dewirements, wear longer than trolley wheels and result in LESS WIRE WEAR.

Miller Trolley Shoe Company
295 Columbia Road, Boston-21, Mass.



MILLER TROLLEY SHOES

Modern Methods



No. 510-A
Railway Motor

THE Brooklyn City Railroad furnishes an outstanding example of modern transportation methods. Traffic conditions on each individual line are carefully watched and cars are shifted to meet the varying conditions. Particular attention is paid to comments of patrons as to the sufficiency of service in their particular localities. Maintenance of the cars and equipment is well above the average. Every effort is made to give the localities served the best possible transportation system which can be developed under existing conditions.

With this policy in mind, Mr. C. E. Morgan has ordered 335 new moderate-weight, low-floor cars, to supplement the added service supplied by 200 similar cars purchased in 1923.

These cars will be equipped with four Westinghouse 510-A motors and double-end K-72 control, making a total of 1740 motors of this type in service in Brooklyn.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries



Westinghouse

X 78780

JOHN A. MILLER, Jr.
Associate Editor
C. W. SQUIER
Associate Editor
O. J. MACMURRAY
News Editor

ELECTRIC RAILWAY JOURNAL

MORRIS BUCK, Managing Editor

HENRY W. BLAKE
Senior Editor
CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

CONTENTS

FEBRUARY 7, 1925

Editorials	209
I. C. R.R. Cars for Chicago Electrification Designed for Heavy Duty	211
Steam railroad practice followed in design of multiple-unit suburban cars. One motor and one trail car semi-permanently connected. Lighting on 32-volt battery circuit.	
Plans for Westchester Traffic.....	214
Tests Show Two-Motor Trackless Trolley Better.....	215
Subway for Street Car Passengers.....	216
Accounting for Stores	217
By R. A. WESTON. An outline of the principles for keeping track of stock and issuing it for use in repair work from the main storeroom, from several storerooms and under all conditions.	
White Steps Reduce Accident Hazard.....	220
An Electrically Operated Refrigerator Car.....	221
Interstate Loop Urged	222
P-O Builds New Freight Terminal.....	223
By M. R. GRAHAM. Double-track yard with freight house, loading platform and team area is located in business district of Youngstown. Facilities are provided to handle double the present business.	
Electric Derail Protects Bridge Crossing.....	225
Railway Makes Concrete Poles in St. Louis.....	226
By C. L. HAWKINS. Automatic Doors Relieve Jim Crow Problem.....	227
By RICHARD MERIWETHER. Association News and Discussion.....	228
The Business Paper of the Future.....	228
By JAMES H. MCGRAW. What it needs of its industry and what it can do for its industry. Assistance in reducing production waste and distribution waste one responsibility.	
American Association News	229
Maintenance of Equipment	230
News of the Industry	233
Financial and Corporate	238
Personal Mention	242
Manufactures and the Markets.....	244

McGRAW-HILL COMPANY, INC.

Tenth Avenue at 36th Street, New York

JAMES H. MCGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MUR, Vice-President
E. J. MEYER, Vice-President
MASON HAYTON, Vice-President
JAMES H. MCGRAW, Jr., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary

WASHINGTON:
Colorado Building
CHICAGO:
Old Colony Building
PHILADELPHIA:
Real Estate Trust Building
CLEVELAND:
Leader-News Building
ST. LOUIS:
Sier Building
SAN FRANCISCO:
992 Mission Street
LONDON:
8 Bouverie Street, London, E. C. 4
Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations



Cable Address: "Machinist, N. Y."

Publishers of
Engineering News-Record
American Machinist
Power
Chemical and Metallurgical Engineering
Coal Age
Engineering and Mining Journal-Press
Ingeniería Internacional
Bus Transportation
Electric Railway Journal
Electrical World
Electrical Merchandising
Radio Retailing
Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
American Machinist—European Edition
(Published in London)

The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries \$3 (total \$7 or \$9 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 25 cents.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least 10 days before the change takes place. Copyright, 1925, by McGraw-Hill Company, Inc. Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office at New York, under the Act of March 3, 1879. Printed in U.S.A.

Use—as Well as Read

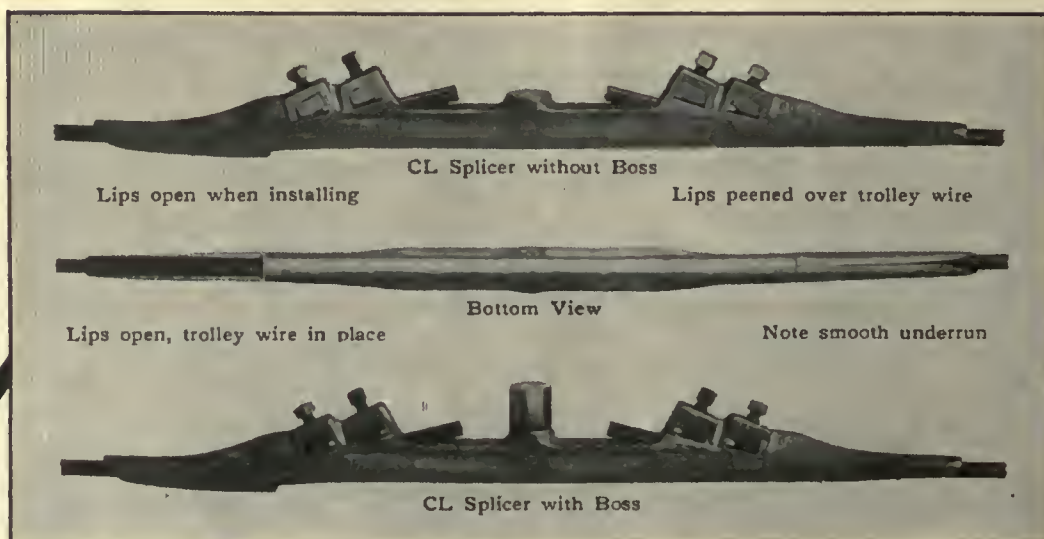
MOST readers use the JOURNAL just in the ordinary way. They read of what various railways are doing of an engineering nature and the methods used, the news of the industry, reports of conventions and announcements of future meetings, details of new rolling stock and personal items about their friends.

Beyond this use, however, many interesting examples come to our attention showing other uses to which the JOURNAL has been put. One railway makes an editorial from this paper the subject of a poster displayed in its cars. Another company, whose achievements are described, sends reprints of the article to all its stockholders. In a town where the railway is having difficulty to secure the co-operation of the merchants in an anti-parking campaign, material published in the JOURNAL is successfully used to clinch the railway's previous arguments. Several contestants incorporate clippings of articles published by this paper in the briefs submitted in competition for the Coffin prize.

So it goes. There isn't room in this column really to list the number of different uses to which the JOURNAL is put. The explanation of this is that the editors have in mind when writing the paper not only to use material about which the readers will want to know for themselves but also to include some material with which railway men can help their case with certain public groups.

A Splicer

That Is Stronger Than The Trolley Wire



The Westinghouse CL Set-Screw Splicer will end your splicer troubles. It is easy to install and is stronger than the trolley wire. — The four set screws hold the wire securely. — The harder the pull the tighter the set screws grip the wire.

Made with and without boss, for all sizes of round and grooved wire.

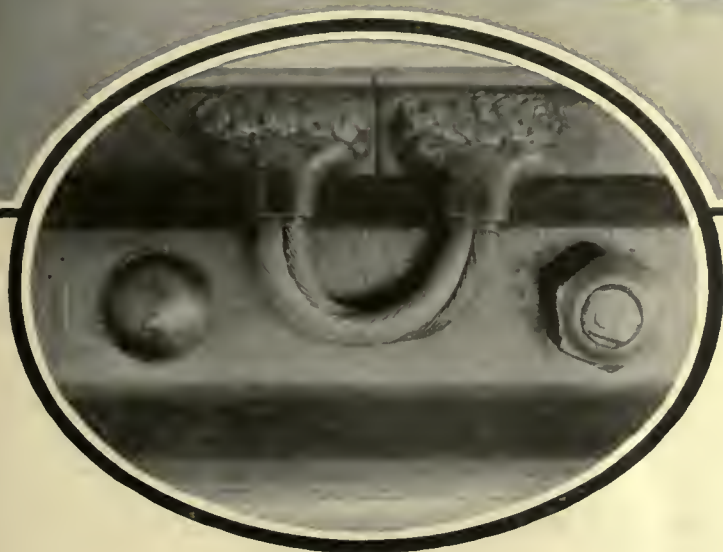
Send for a sample.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pennsylvania
Sales Offices in All Principal Cities of the
United States and Foreign Countries.



Westinghouse

X 78773



Up to a Standard

O-B Arc Weld Bonds were developed to meet an O-B established high standard, not to take their place with the average.

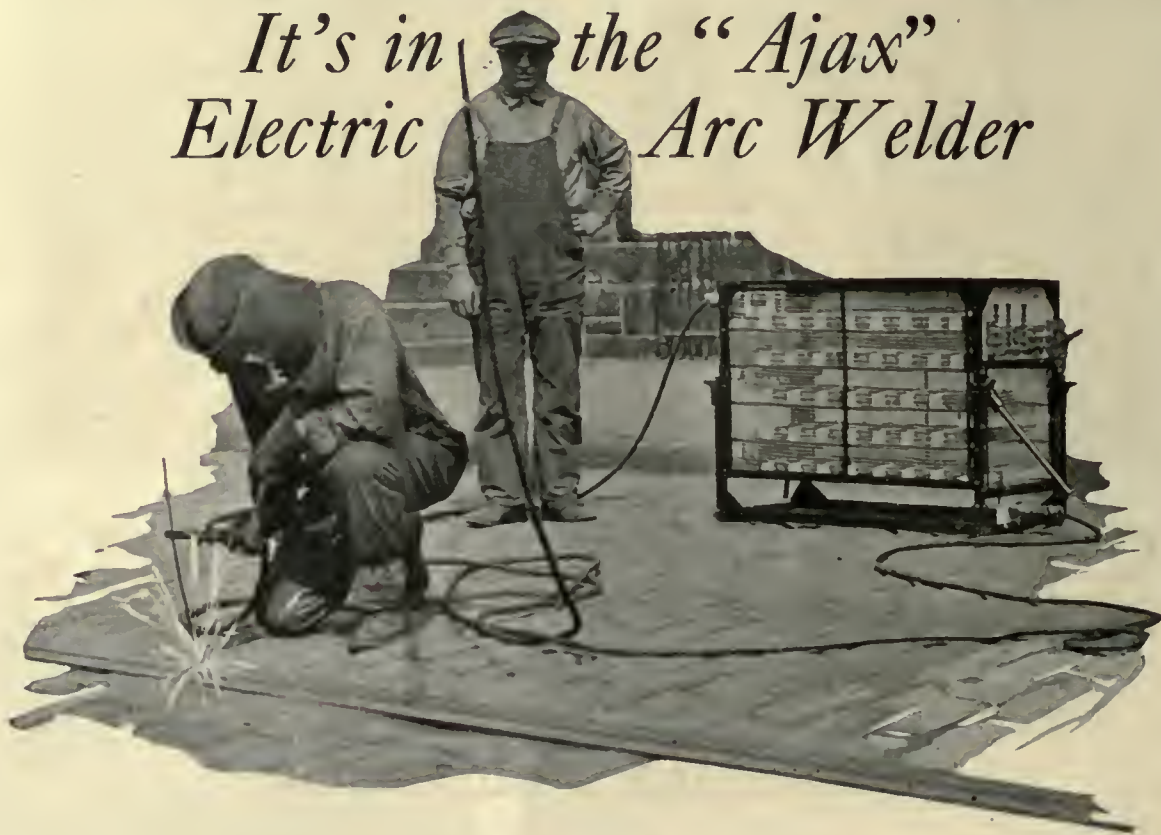
These Type AW Bonds, one for base of rail and one for ball of rail, have carried their responsibility. They are easy to weld, and therefore insure the highest percentage of good rail joints.

The Ohio Brass Co.
Mansfield, Ohio

B RAIL BONDS

The Secret of Good Welding

*It's in the "Ajax"
Electric Arc Welder*



NO matter how good the equipment, you can get a good weld only with good work by the welding crew. But even a good crew can make lasting welds economically only with adequate welding equipment. Hence the importance of knowing the Ajax welder. Consider its fine points:

Take current capacity first. Ajax will give you 209 amperes even at 300 volts, which is the maximum capacity of other welders at 550 volts. "Ajax" has regulating switches which provide a range of current from 19 to 333 amperes at normal line voltage with intermediate steps of

18 amperes each. You get ample capacity for adequate penetration even where the voltage drop is 50%. And that in a light-weight outfit—120 lbs. for type RWY, 18x28x36 in.

There are other good points such as simple circuits all exposed to view, non-oxidizing resistance wire, ample ventilation, all parts accessible, a shunt switching device that insures large currents even where voltage is much below normal.

Finally—price—you'll be agreeably surprised when we tell you how low it is. Do you know? Ask us.

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

Chester F. Gallor, 30 Church St., New York
Chas. N. Wood Co., Boston

AGENTS:

Electrical Engineering & Mfg. Co., Pittsburgh

Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London

256



STEEL TWIN TIES

*Low Initial Cost—Long Life Joints
Renewable Foundation*

THE REASONS for the continually growing interest in steel tie construction for paved track work which are stated above are definitely based on experience. The cost records for 1924 (where the work was installed with modern equipment) are apparently less on the index basis than pre-war costs.

The long life of joints (the weakest

point in any track) is on record showing up to thirteen years' experience.

The renewal methods are being utilized on upwards of five miles of steel tie construction this Summer. The first renewal has had a two-year test.

All this data, too voluminous, for this space is included in our folder "Steel Tie Track Construction." Ask for it before settling this year's construction plans.

The International Steel Tie Co., Cleveland, Ohio

Steel Twin Tie Track

Renewable Track . . . Permanent Foundation

Modern Signal Protection



Electro-Pneumatic
Interlocking at
Terminal Station
of Philadelphia &
West Chester
Traction Co.



At the new Philadelphia Terminal Station of the Philadelphia & West Chester Traction Co., UNION ELECTRO-PNEUMATIC INTERLOCKING allows car movements to be speeded up and insures against conflict of simultaneous movements.

Let one of our engineers study your operating conditions and co-operate with you in considering what Interlocking and Automatic Block Signals will do for your Railway.



Union Switch & Signal Co.

SWISSVALE, PA.



*Member of the
Keystone
Family*



Keystone Compensating Fixtures

The burning out of any lamp in a series car lighting system will not affect the burning of the remaining lamps when Keystone Compensating Fixtures are used.

The fixture itself consists of an ornamental fire-proof canopy in which is contained the necessary number of enameled resistance units to represent the equivalent capacity and resistance of one incandescent lamp. The resistance is normally

out of the circuit, but the removal, breaking, or burning-out of a lamp automatically connects the resistance in series and thus the continuity and normal resistance of the circuit is maintained.

The growing tendency toward the operation of high candle power incandescent headlights in series with one or more circuits of car lamps and also the increasing use of larger units in car lighting has made a device of this character practically a necessity.

Consider these advantages

- Greatly reduced cost of lamp renewals.
- Greatly lessened loss of lamps from theft.
- Immediate evidence of burned-out lamp.
- Vastly improved appearance and lessened glare.
- Greatly simplified car wiring.
- Better illumination for a given total wattage consumption.

ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.
PITTSBURGH
829 Oliver Building

NEW YORK
50 Church St.
SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.
BOSTON
88 Broad St.

Lyman Tuba & Supply Co., Ltd., Montreal, Toronto, Vancouver





If you operate buses—



If you are using Motor Buses to supplement existing street car service—

If you hope to thus secure new patrons to produce additional revenue—

If you want to assure your bus patrons the same degree of protection that modern rail transportation provides—

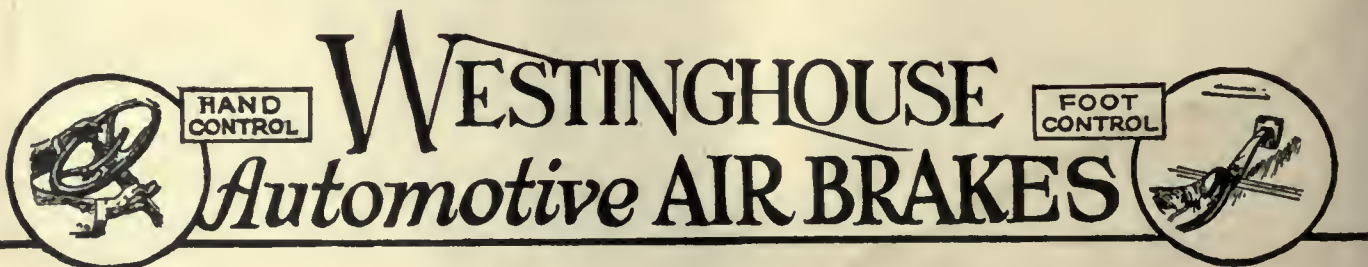
If you want to realize the maximum utility, as well as safety, in the operation of your buses—

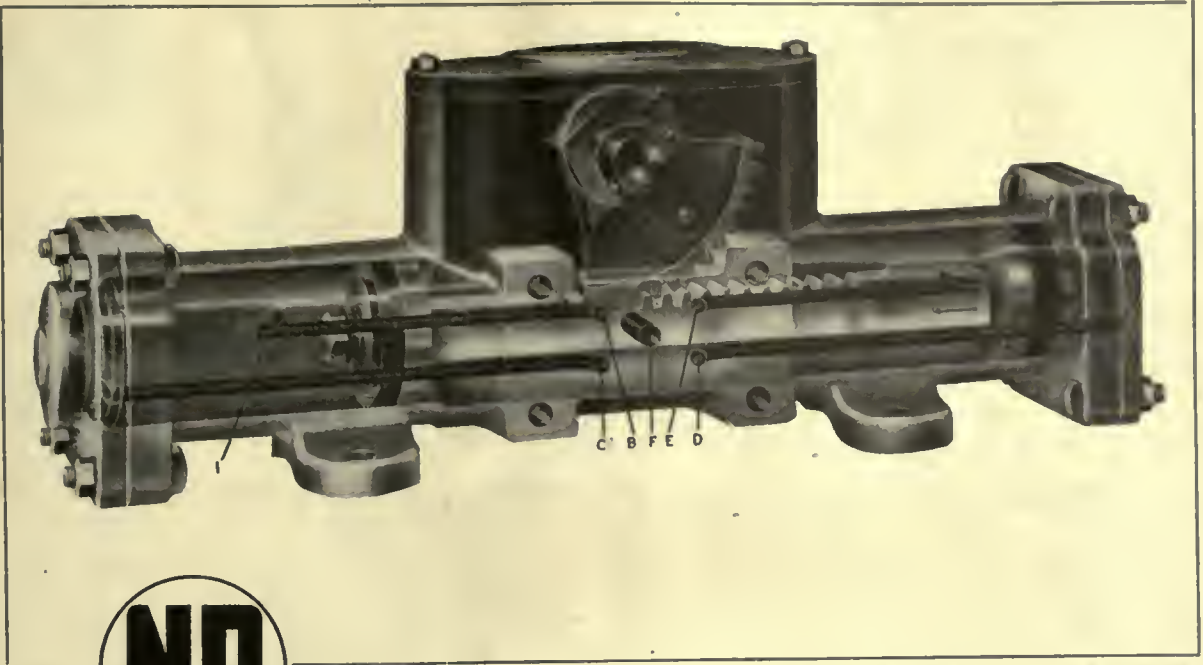


Eighteen prominent Street Railway Companies are now enjoying the benefits derived from the use of Westinghouse Air Brakes on their buses.

Use Westinghouse Automotive Air Brakes

WESTINGHOUSE TRACTION BRAKE CO.
Automotive Division, Wilmerding, Pa.





PNEUMATIC ENGINE WITH VALVE REMOVED

You have seen both old plant and the new plant of the National Pneumatic Company. Here is one of the products that is made in the new plant—the pneumatic engine—ideal tool for operation of car doors and steps. Following advertisements will show you *how* this engine and accompanying mechanisms are constructed.

NATIONAL PNEUMATIC COMPANY

Executive Office: 50 Church Street, New York

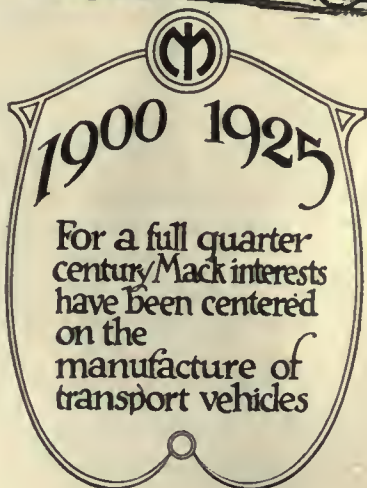
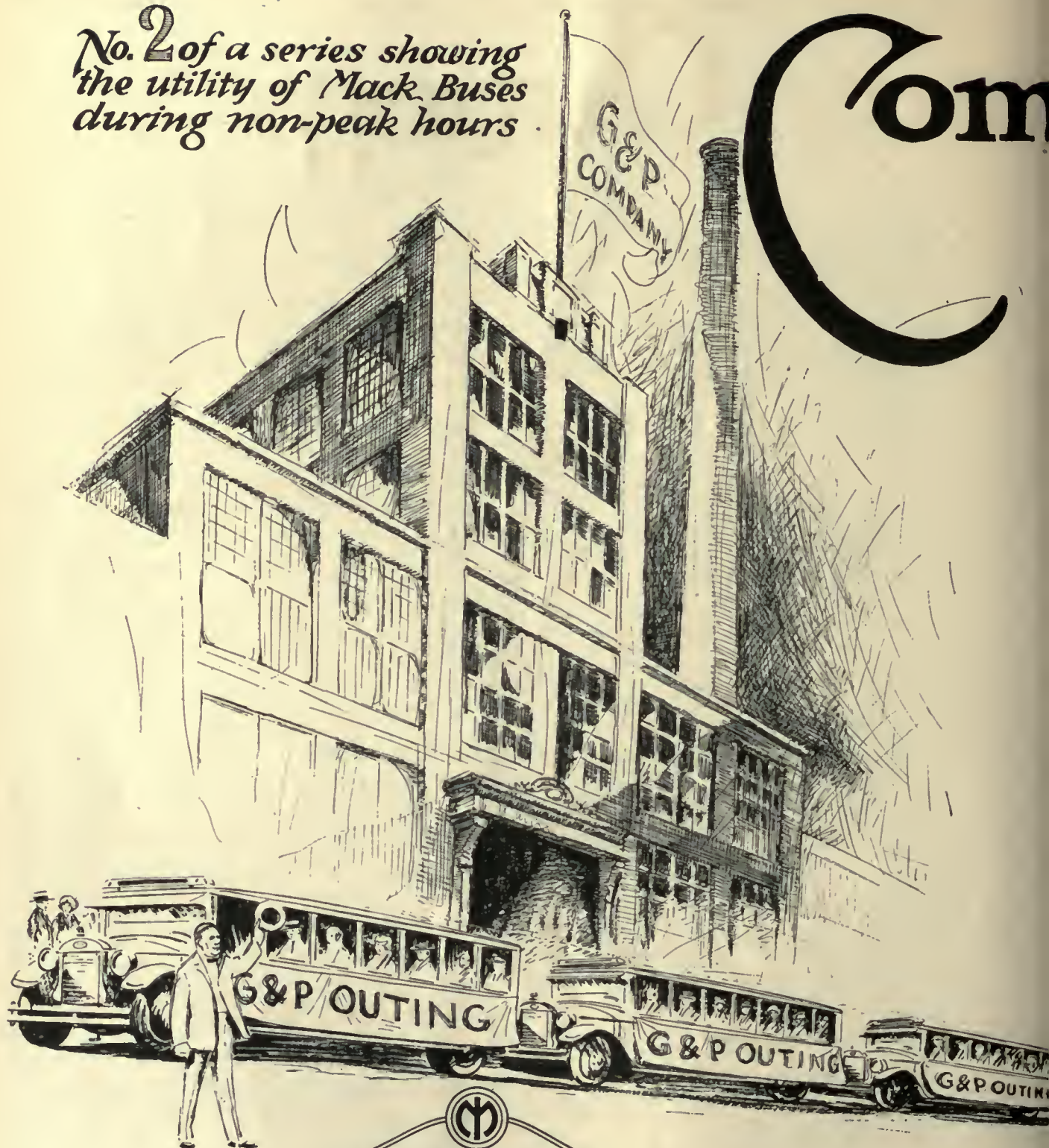
General Works, Rahway, New Jersey

CHICAGO
McCormick Building

MANUFACTURER IN
TORONTO, CANADA
Dominion Wheel & Foundries, Ltd.

PHILADELPHIA
Colonial Trust Building

*No. 2 of a series showing
the utility of Mack Buses
during non-peak hours*



pany Outings

Most of the large commercial and industrial houses set apart one day each year for a company outing. Employees want to get away from the turmoil of town or city life and play in the open air, so a beauty spot or picnic ground is chosen and the need arises—for buses.

Such bus business is but one of many ways in which the electric railway company operating Macks can make profitable use of equipment during non-peak hours, and at the same time establish a service of incalculable goodwill value among its more influential patrons.

Mack all-bus design, coupled with quality construction in every detail from bumper to tail light, helps foster such goodwill, while affording utmost operating economy and low depreciation.

The remarkable feature of the improved Mack Bus Engine is that great additional power has been gained without increasing the diameter of

the cylinders. This in turn has made it possible to maintain the established low operating and maintenance record of all Mack Engines.

Mack dual reduction rear axle is strictly a bus axle designed to give utmost road and underbody clearance with straight line transmission.

The Mack Bus Chassis is built long and low, with a specially wide front axle for safety, and to contribute toward easy handling. The Chassis, including engine and transmission, floats on eight cushions of live resilient rubber, in which the long flexible spring ends are imbedded.

These are just a few of the famous Mack features. Let Mack Bus engineers explain the rest and help you plan railway-bus co-operation.

MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY

25 BROADWAY

NEW YORK CITY

Eighty-eight direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

The Mack Bus



25 Passenger, City Type

Performance counts!



One of a number of Safety Cars now being operated in Pittsburgh, Penn. to help improve a difficult traffic situation.

Living up to a Slogan

"Pittsburgh Promotes Progress" is a slogan adopted by the City of Pittsburgh to state a fact and stimulate action.

Forward movements are encouraged, and readily adopted for the city's betterment when they have proven merits.

One of the latest progressive ideas to be espoused is the Safety Car.

65 one-man, two-man cars, having Safety Car Control Equipment, were recently put into service by the Pittsburgh Railways Company.

One more traction property will realize the economic advantages, one more city will enjoy the service benefits, which result from using Safety Cars.



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH



Introducing

The subject of
Voltage Regulation
 for the automotive equipment
 used by electric railway lines

A starting and lighting system that maintains constant voltage

Like a governor to control engine speed, or a thermostat to maintain uniform temperature conditions, a voltage-regulated starting and lighting system is recognized today as essential to satisfactory and efficient operation of motor buses.

Leece-Neville equipment—consisting of generator, starting motor, magnetic switch and voltage regulator units—is a comprehensive 12-volt system which delivers and maintains a uniform voltage for lighting, starting, igni-

tion, push button signals, stop-light and other electrical devices used on buses. It affords ample current for all services, under absolute voltage control at all times, regardless of speed, number of stops, starting pull or other severe operating conditions.

Adopted by many of the leading chassis makers as standard equipment—White, Moreland, Brockway, Mack, Schacht, Garford, Brill, Commerce, Guilder, Autocar, Larabee-Deyo, Wilcox, Oneida and others.

THE LEECE-NEVILLE COMPANY
 CLEVELAND, OHIO



LEECE-NEVILLE

VOLTAGE REGULATION





General view of new, complete terminal of The Detroit Motorbus Co., Dexter Blvd., and Penna. R.R. Architectural design, construction and equipment by The Austin Company. This Terminal is comprised of Administration Building, Body Shop and Garage.

Modern Terminals for Detroit Motorbus and D. U. R.

THE Detroit Motorbus Company, an outstanding example of a successful modern metropolitan transportation system, has again called upon Austin for building service.

The first contract, in 1921, was for the design and construction of the East Side Garage at Terminal and Edlie Streets, with a capacity of 80 double-deck buses of the Fifth Avenue type.

This was followed by a repeat contract for the complete Motorbus Terminal at Dexter Boulevard and Pennsylvania Railroad. This includes a large, modern administration building with offices, school for operators, etc., and a body shop and repair building with paint shop, forge shop, electrical department,

completely equipped to make running repairs and periodical overhauling.

The garage at this terminal with a 100-ft. center aisle has a capacity of 100 buses. It is well daylighted with abundant ventilation which provides a complete change of air at frequent intervals. Underground storage tanks contain large stocks of gasoline, motor and fuel oils.

The efficiency of Austin design, as demonstrated in service of Detroit Motorbus, led to its adoption by the Detroit United Railways for their Gratiot Ave. terminal in Detroit, and the D. U. R. terminal at Flint, Mich. These buildings are now under construction by The Austin Company.

The AUSTIN COMPANY - - - - Engine

New York

Chicago

Pittsburgh

St. Louis

Birmingham

Detroit

Philadelphia

Seattle

Portland

**THE
AUSTIN METHOD**

AUS
FINANCE DESIGN



Interior of the well daylighted and ventilated garage at the Detroit Motorbus Terminal at Dexter Blvd., and Penna. R. R. Capacity, 100 double-deck buses. The building also contains an aisle for running repairs. Underground fuel storage has a 35 tank car capacity.

Austin Success in the Transportation Field

AUSTIN has grown up with the whole Transportation field. With a background of fifty years of industrial building, The Austin Company has had years of successful experience in designing and building for the largest railroads of this country—engine terminals, locomotive erecting shops, round-houses, machine shops, car shops, etc.

In the automotive field Austin has built scores of garages, sales and service, and repair stations, automobile and truck plants, complete body plants, warehouses and foundries, in every type of building, multi-story and single story.

The design evolved for Bus Transportation Terminals has been approved as highly efficient by well-known operating officials, notably by Mr. W. F. Evans, President of the Detroit Motorbus Company.

Austin will design, build and equip for Bus Transportation Companies anywhere. Thirteen established Austin offices in principal industrial centers provide local control for your project wherever located.

Every detail of your project will be handled under the Austin Unit Responsibility Plan with one contract which provides—

- 1—A guaranteed lump-sum price covering the complete job;
- 2—A guarantee that the complete plant will be ready by a specified date, with bonus and penalty clause, if preferred;
- 3—A guarantee as to quality of material and workmanship throughout.

Wire, phone or mail the coupon for a copy of the Austin booklet, "The A No. 1 Plan."

and Builders - - - CLEVELAND

The Austin Company of California: Los Angeles, San Francisco

The Austin Company of Texas: Dallas

TIN

CONSTRUCTION EQUIPMENT

The Austin Company, Cleveland

You may send me a copy of your booklet, "The A No. 1 Plan."

We are interested in the construction of.....

..... data

Firm

Individual

Address

E.R.J. 2-23



GENERAL ELECTRIC COMPANY

RAILWAY AND MINE HAULAGE MOTORS
ARMATURE COILS FOR TYPE GE MOTORS

M. No.	V. in.	Turns	Conductor	Coils in Set	Cat. No.	Net Wt. on Lb. per Set
GE-211	600	4	No. 11 B.W.G.	35	136031	75
GE-232	600 1200	2	No. 10 B.A.S.	21	157091	57
GE-233	600	2	2 No. 10 B.A.S.	29	157091	91
GE-241	600 1200	2	2 No. 12 B.W.G.	29	157092	86
GE-242	600	2	No. 11 B.W.G.	20	144377	64
GE-243	775	1	0.08 x 0.700 in.	37	* 157093	180
GE-247	750 1500	2	0.100 x 0.250 in.	30	157096	220
GE-248	600	2	No. 10 B.A.S.	31	157097	80
GE-249	1200 2400	2	3 No. 10 B.A.S.	37	157098	200
GE-240	800	1012	3 No. 9 B.A.S.	20	177183	140
GE-240	600 1200	2	2 No. 9 B.A.S.	29	164304	140

Stick to Known Value

One operator says: "G-E Coils couldn't be improved. So now they're packaged to guarantee original quality on the job."

There is no true substitute for G-E Armature Coils for G-E Motors. And now supplied in cartons, G-E Coils are sure to be preserved undamaged until ready for use. Besides, the cartons are a great convenience, each containing a set of coils for one armature.

To get the same efficiency as from your original coils, to secure maximum armature life, and to insure satisfactory service from your G-E Motors you must rewind with G-E Armature Coils. Each is an exact duplicate of the other.

Use
your
Catalog

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities



GENERAL ELECTRIC

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

MORRIS BUCK, Managing Editor

Volume 65

New York, Saturday, February 7, 1925

Number 6

Assuring Success of the Midyear Meeting

PREPARATIONS for the Midyear Meeting of the American Electric Railway Association, which is to be held in Washington on February 17, have been carried on so quietly and efficiently that the date is almost here without its approach having been realized. Present indications are that it will be one of the most successful midyear meetings in the history of the association.

The program will take the form of a "town meeting" at which the main topics will be "What Are the Facts About Electric Railway Service" and "Motorbuses—When, Where and How They Should Be Used by Electric Railways." The outstanding character of men who will lead the discussion insures full and free consideration of both topics, which are of such vital importance to the industry that every electric railway executive who can possibly do so should attend.

In addition to the main sessions, Monday will be taken up with some 17 committees of the American and affiliated associations. Since the membership of the committees includes many leaders of the industry, a nucleus is assured for a most successful and inspiring meeting.

Interurban Activity Attracts Attention

NEWS developments this week indicate that at least one extremely successful utility executive is engaged in a program of acquiring interurban roads. That man is Samuel Insull of Chicago. He has just taken over the Chicago & Joliet Electric Railway and is about to take over the Chicago, Lake Shore & South Bend Railway.

Undoubtedly these apparently independent steps are part of a much larger plan. That is important. More significant at this time, however, is that this shrewd judge of utility values is buying interurban roads and that the roads are of a type that were considered by some not to have a very promising future.

Mr. Insull has always been a bull on the utility business. The growth of the properties under his management speaks for itself. Now he apparently is a bull on the interurban situation. Not so many years ago he acquired what is now the Chicago, North Shore & Milwaukee Railroad, a bankrupt interurban in apparently a hopeless condition. In 1923 that road was not only healthy financially but won the first Coffin medal. In the opinion of some, the North Shore line was in a situation unlike that of most interurban properties because it had the advantage of two large cities as terminals. The same has been said of another Insull road, the Interstate Public Service Company, operating between Indianapolis and Louisville. This condition does not apply in the case of the roads just purchased.

There are many interurbans elsewhere in the country

similarly situated that lend themselves to such treatment as he apparently has in mind for his recent acquisitions. Whether or not such roads must be welded together to accomplish the best results depends upon the particular situation. But in any event the desired result can be achieved only by the intensive application of modern operating and merchandising methods. There is no other open sesame to success.

Atlanta Makes a Good Start

ATLANTA has at last fallen into line. That city is going to tighten the regulation of its jitneys. Atlanta has been slow to profit by the experiences of Toledo, Saginaw, Des Moines, Akron and the cities in New Jersey where railway service has been suspended in the past, but Atlanta's lesson appears to be a salutary one. Atlanta has been told and told and told the consequences of its mistaken policy with respect to jitneys, but it has refused to heed the warnings. It had evidence close at hand at Augusta of the effect of unfair jitney competition, but not until the dire consequences of what the suspension of service meant in the case of the Atlanta Northern Railway at Marietta did the realization sink in that the cry of distress was sincere that had been made by the Georgia Railway & Power Company.

Stated very briefly, Atlanta's idea now is to eliminate motor vehicles carrying fewer than 20 passengers, require an indemnity bond of \$5,000 for each vehicle, issue no motor vehicle permits for routes on which railways operate, prohibit a bus line from running within two blocks of a railway line for a distance of more than five blocks on its round trip and, most important of all, rule out jitneys and buses entirely from the so-called congested limits of the city as defined by the fire department.

In adopting this sane course with respect to the jitney Atlanta is following the recent engineering advice given by the Beeler Organization, the details of which have been covered in articles appearing in this paper for Jan. 10, Jan. 24 and Jan. 31. The expert findings, intended to guide the future course of the city, said that the jitney has no place in any real transportation plan and that it is useless in mass transportation and worse where congestion is acute. The Marietta experience, under the very eyes of Atlanta, added the force of facts to these findings.

Eventually far-reaching effects may reasonably be expected to follow the negotiations that are sure to come as a corollary to the presentation of the recent engineering report. There is no gainsaying the fact, however, that the Marietta suspension, as indicated before, hastened action against the jitney—action that has been unreasonably delayed at a cost to the city that is incalculable. No matter what the eventual outcome, Atlanta is paying dearly for the mistaken policy which it has pursued. Having a report and acting on it are two dif-

ferent things. The start has been made with respect to the jitney. It is to be hoped that this action is the forerunner of further favorable developments.

Publish Convention Dates Early

DURING the year, the total of all railway conventions and sectional association meetings amounts to a surprisingly large number of events. In many cases several meetings follow each other in rapid succession. Such conventions are much to be desired. The opportunity given railway men for comparing experiences helps to keep each man in touch with what his neighbors are doing, and adds stimulus and interest to the everyday tasks.

In many of these meetings the representatives of manufacturers take a prominent and important part. They frequently have places on the programs, and thus give to the operating men the benefit of their experience and observations as specialists.

Early publication of meeting dates will help these men to make up itineraries that avoid lost time and expense through taking long special trips. Not only will this saving be made, but early information of a coming meeting will enable men to attend who otherwise could not do so.

Transit Facilities in a City with 20,000,000 Inhabitants

THE present efforts in our largest cities to plan for future transportation facilities are especially welcome in view of the troubles which have come from past neglect. All of our large cities are adding rapidly to their populations. In the case of New York, it is estimated that by 1930 the territory within 40 miles of the City Hall will contain more than 10,500,000 inhabitants, and that in 20 years more the population within this area will be 17,000,000, of whom 7,000,000 will live outside the present limits of the city. This means a tremendous increase in demand for transportation in the metropolitan district which must be met, if congestion on all lines of travel in exaggerated form is to be avoided.

Two recent reports on suggested improvements in transit facilities between New York and its environs are abstracted in this issue. One relates to entrance to New York from Westchester County on the north, the other to better communication across the Hudson River. The former was prepared for the Board of Supervisors of Westchester County, while the latter was conducted by a state commission in New Jersey. Though prepared by different engineers, they have strikingly similar recommendations, which may be considered to be in line with present thought on the subject. In both cases, most of the traffic from the districts is by steam or electrified railroad to existing terminals. Each report proposes to transfer this traffic to a distributed terminal in the form of a subway in Manhattan Borough. The distributed terminal, in contradistinction to the concentrated terminal of the average trunk line railroad, is primarily a rapid transit idea. But the railroad terminals in our large cities are now so congested and their expansion with existing realty values would be so expensive that their owners would be glad to devote them to through traffic and be relieved of commuter travel. Their capacity would then be adequate for years to come.

Another point of similarity in the two plans is the idea of through train service. In the New Jersey plan, this would be accomplished by a loop which, in Manhattan, would extend from near the southern end of the island to about 57th Street and in New Jersey would join the trunk line railroads coming in from the west. In the Westchester project, through traffic is suggested by an extension of the Manhattan subway to New Jersey, connecting possibly with a North Jersey rapid transit system.

Rapid transit extensions of the kind described are bound to be an important development of electric railways during the next few decades. In many cases, of course, electrification of the connecting steam suburban lines must follow to give through running and obtain the best results.

Publisher Responsibility— Reader Opportunity

NO ONE can project himself very far into the future and read ahead with any great degree of accuracy. The times move too fast for that. Men can, however, keep themselves well informed. In fact, the tendency is growing to weigh cause and effect much more carefully than in the past. In addition the standard of business ethics is much higher than it was. The injection of engineering elements more and more in business has had the effect of making business more exact. It is not repression, but an added feeling of responsibility that is abroad, and nowhere does this feeling of responsibility manifest itself to a greater degree than in the business press of the country. This sense of responsibility is constantly being borne in upon the editors of the McGraw-Hill papers, of which *ELECTRIC RAILWAY JOURNAL* is one.

Working out in the field the editor must preserve his individuality. His responsibility is first to his readers and then to his industry, but beyond that his great responsibility is to the general public. These considerations and others were emphasized at the recent annual convention of the business and editorial staffs of the McGraw-Hill publications held in New York. At that meeting Herbert Hoover, through the medium of F. M. Feiker of the Society for Electrical Development, said that the business press is probably the greatest force in making industrial opinion. Men do get together in the physical sense at conventions and meetings to exchange ideas and they do so with good results to themselves and to their industry, but it is through the medium of the business press that the real avenue is opened to them for the discussion of problems in which they are interested.

After all, as Mr. Hoover has so aptly put it, the industrial press has been in large part responsible for the change from rule-of-thumb and *laissez-faire* methods to scientific determination of facts and programs of action based on facts. Every issue of *ELECTRIC RAILWAY JOURNAL* and every page of every issue is edited with that end in mind. Facts do not always lend themselves to statistical presentation, but facts remain facts even though the romantic method of presentation be applied to them, as is often done in the industrial press. No two men will probably ever interpret facts exactly alike. That would be expecting too much. Business cannot, however, form a right judgment unless it knows the facts. It is the province of the business press to supply the facts.



New Illinois Central Cars Similar to These Will Operate on the 1,500-Volt D.C. Circuit in Chicago Suburban Service. A Motor Car and a Trail Car Are Semi-Permanently Connected to Form a Unit. A Train Is Made Up of from One to Five Units

I. C. R.R. Cars for Chicago Electrification Designed for Heavy Service

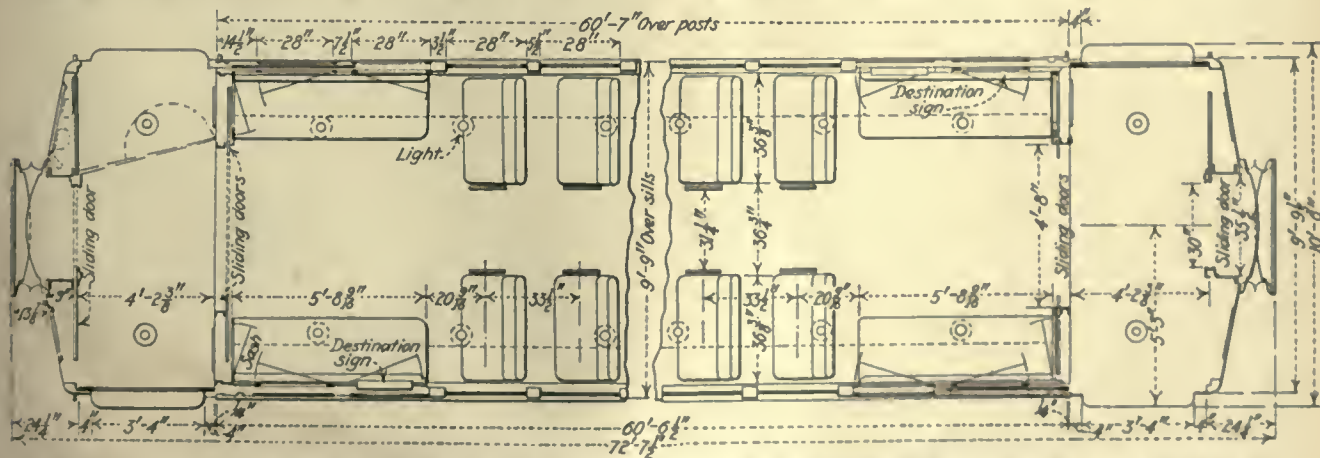
Steam Railroad Practice Followed in Design of M-U Suburban Cars — One Motor and One Trail Car Semi-Permanently Connected—Lighting on 32-Volt Battery Circuit—Cars to Be Operated from 1,500-Volt D.C. Catenary Trolley

SAFETY, speed and passenger comfort were given first consideration in the design of the 215 new suburban cars recently ordered by the Illinois Central Railroad for use on the lines now being electrified in Chicago and vicinity. These cars will be operated over the Chicago Terminal Division, which extends into the suburbs on the south side of the city. They will be similar in construction to 45 trail cars now in the same service but at present being pulled by steam locomotives. Of the 215 new cars, 130 will be motor cars built by the Pullman Car & Manufacturing Corporation. The other 85 new cars will be trailers built by the Standard Steel Car Company. These, together with the 45 cars now in steam service, will give the company 130 suburban trailers. One motor car and a trail car will be semi-permanently connected. These two cars thus connected will be called a unit and trains will be made up of units as traffic demands. The number of cars on hand and on order

provides for 130 such units. The maximum length of train will be five units or 10 cars.

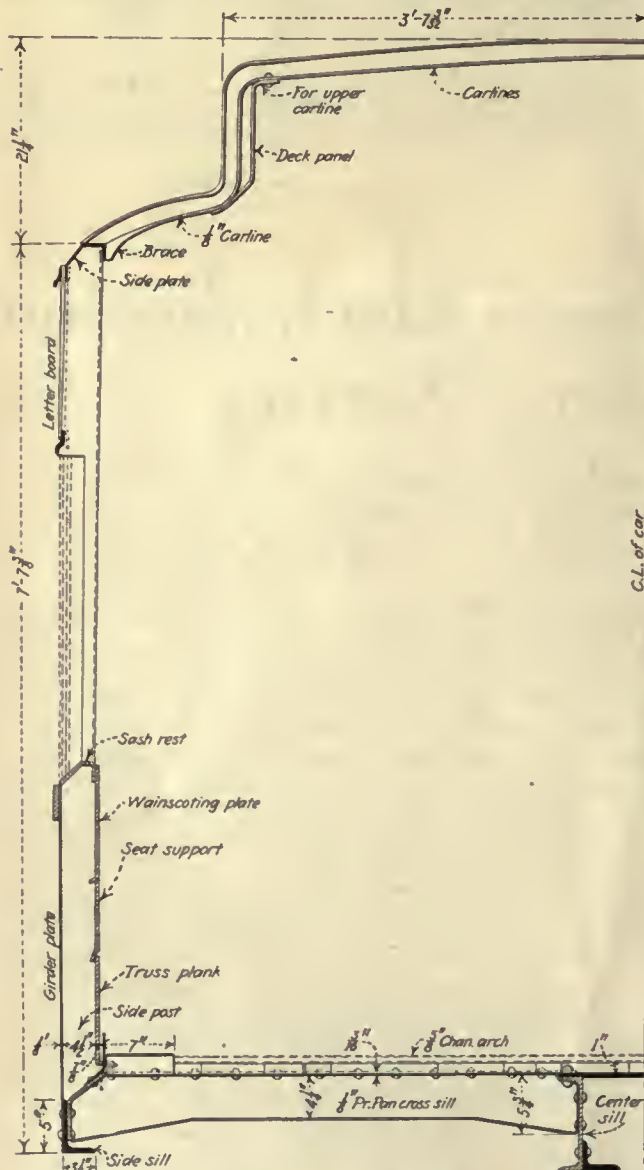
Steam railroad practice is followed closely in the design and construction of the cars. They are 72 ft. 7½ in. over buffers and 9 ft. 9¼ in. over side sheets. The construction is of steel and aluminum alloy throughout. The motor cars will weigh 125,000 lb. and the trailers 84,000 lb. As each car seats 84 passengers, the weight per passenger for the motor cars is 1,490 lb. and for the trailers 1,000 lb.

Like the present steel suburban cars, the new cars will have monitor type roofs, inclosed vestibules and single-sash windows. As flush platforms are installed at all stations, steps will be provided at one end of the trail cars only, for emergency use. The cars will be painted on the outside with standard Illinois Central Railroad green and will have mahogany finished aluminum interior trim with white Agasote ceilings and maroon mastic floors.



Seats for 84 Passengers Have Been Provided on 34 Cross Seats and Four Longitudinal Seats. The Cars Are Vested with Diaphragms Between Cars. Sliding Doors Permit Easy Entrance and Exit

Steel structural shapes, pressings and castings are used in the underframe construction. The center sill consists of a box girder built up of two 9-in., 15-lb. channels with top plate. The side sills are 5-in. x 3½-in. x ⅝-in. angles. On the motor cars all sills extend from one buffer casting to the other. On the trail cars the side sills extend from the buffer casting at the control end to the body end sill at the opposite end, to allow for step wells at that end of the car. The car flooring is



Section of Heavy Steel Underframe Which Carries Steel Constructed Body Having Aluminum Roof and Inside Trim

carried on six steel stringers and three wood stringers, which are supported by pressed steel pan cross sills spaced on 33½-in. centers. The floor supports at the side sills are 2½-in. x 1½-in. x ⅝-in. angles riveted to the side posts. Intermediate floor stringers of the same size are located between the center and side sills. The center supports consist of two Z-shaped pressed members riveted to the center sill. The wood supports are placed between the steel stringers.

The body bolsters are built up of two pressed steel pans of ⅝-in. steel, placed back to back 10 in. apart and reinforced by ⅝-in. top and bottom cover plates. Two cross-bearers near the center of the car are built up of ½-in. pressed steel pans with top and bottom cover plates and act as auxiliary bolsters serving to

stiffen the frame. The platform floor is one piece of ⅝-in. diamond pattern sheet steel. This acts as an anti-telescoping plate on the motor cars and at the control ends of the trail cars.

In the body of the car the sub-flooring consists of No. 20 gage galvanized copper-bearing sheet steel, covered with one layer of three-ply Salamander felt. A ½-in. air space separates this from the top flooring, which is No. 22 gage Chanarch corrugated steel with a section depth of ⅝ in. This is placed crosswise of the car, and the floor wearing surface, of Johns-Manville mastic, is laid ⅝ in. deep over the top.

Two pressed steel channels with cover plates approximately 6 in. wide form side posts of box construction. These are spaced on 2-ft. 9½-in. centers and extend from the side sill angles to the side plates at the eaves. The side girder plates are ½-in. steel, riveted to side sill angles, posts and flange of the sash rest. Above the single sash windows is a ½-in. steel letterboard 15 in. wide.

The monitor type roof is carried on continuous pressed U-shaped steel supports, which extend from side plate to side plate. They are spaced on 2-ft. 9½-in. centers, the same as the side posts. On the motor cars the carlines over each bolster are designed to carry a 1,000-lb. pantograph. Deck frames, eave moldings, upper and lower decks of the roof are covered with ⅝-in. sheet aluminum alloy.

Insulation against cold consists of two layers of three-ply Salamander on the insides of all outer side sheets, body end sheets and the undersides of both upper and lower deck roof sheets. The sliding vestibule door pockets are insulated in a similar manner.

Of the 21 windows on each side of the car, the two located at each door pocket have a stationary outside sash and an inside sash arranged to swing open to give access to the door track and mechanism. The other side windows are single sashed, arranged to raise, and are provided with Pantasote curtains. The glass is set in a mahogany frame, which has rubber weather strips at top and bottom.

ELECTRICALLY OPERATED DOOR

The electrically operated outside sliding doors on the sides are operated by electric motors controlled by push buttons located in the vestibules. These and the hand-operated double doors in the bulkhead between vestibule and car body are of aluminum. All doors on a side may be opened from either end of both cars of the unit, or each door may be controlled individually. This arrangement allows one guard or trainman to operate the doors of two units or four cars. A door-control switch in the motorman's cab permits separate control of the adjacent door. Each door has a safety contact shoe in the edge, with a rubber sheath over a phosphor bronze spring. The electric door engine will stop its movement if a passenger is struck by the door in closing. After the obstruction is removed the door will continue its motion. A signal light notifies the motorman in the front cab when all the doors in the train are closed. By connecting this circuit through the reverser lever, a green lamp is lighted when the train is being operated forward and a yellow lamp is lighted when the train is reversed. The door operation and signal system are on the 32-volt battery circuit. This equipment is to be furnished by the Consolidated Car Heating Company.

Pantograph safety gates are attached to each corner of the car. Those on the control end have face plates and are held in the open position by springs, to press together the face plates of two adjacent units. The safety gates between the motor and the trail cars have no face plates, but may be easily uncoupled from either car.

Two pantographs mounted on the roof of each motor car collect the 1,500-volt direct current from the catenary trolley wire. One of these will be used in regular service, the other in emergency.

A headlight mounted above the vestibule door at the control compartment end contains a 100-watt, 32-volt, concentrated filament lamp, backed by a "Golden Glow" reflector in which the bulb is adjustable for focus. Without dimming resistance, the headlight throws a beam of approximately 130,000 cp. Electric tail lights are mounted on brackets at the rear of the train.

The motor cars are mounted on 50-ton capacity trucks with 6-in. x 11-in. journals and the trail cars on 40-ton capacity trucks. These trucks are four-wheel Commonwealth Steel Company's cast-steel design, with "Simplex" clasp brakes. Each motor truck carries two 750-volt motors of 250-hp. nominal rating, permanently connected in series. Westinghouse A-2971 motors are used on 65 of the motor cars, while the other 65 will have General Electric No. Z-1231 motors. The motors are inside hung. The motor trucks have 38-in. rolled steel wheels and the trailer trucks 33-in. rolled-steel wheels. The trucks, particularly in the spring suspension, are designed to give easy riding qualities, insuring safety at high speeds.

INTERIOR FITTINGS

Thirty-four reversible cross seats and four longitudinal seats are used. On 190 cars the seats are to be supplied by Hale & Kilburn, while on the other 25 cars Heywood-Wakefield seats will be used. These are covered with natural color rattan and have high backs and 36-in. cushions, 18½ in. above the floor. No arms are provided, allowing a 36-in. aisle between seat backs. The seats are spaced on 33½-in. centers, a seat being opposite each window. Each longitudinal seat accommodates four passengers alongside of two windows at the end of the car.



Rattan High Back Seats, Mahogany Finish Aluminum Trim, White Agasote Headlining and Maroon Painted Mastic Floor Feature the Interior



Flush Station Platforms Render Car Steps Unnecessary Except for Emergency Purposes

Electric heat with thermostatic control is furnished by 34 cross seat heaters dissipating 750 watts each, eight longitudinal seat heaters of the same rating and a cab heater of 1,000-watt capacity. These operate with 17 coils in series on the 1,500-volt circuit. A piece of sheet aluminum covers the bottom of the seat, while a narrow guard plate mounted directly in front of the heater prevents passengers coming in contact with it. Electro-pneumatic 1,500-volt heater switches are controlled by two thermostats, one of which cuts off the heat at 50 deg. and the other at 70 deg. The former is for use when the car is in the yards and the latter when the car is in service. A selector switch allows either one to be used. The thermostat actuates a relay through a 32-volt circuit.

Interior illumination is by means of 28 bracket fixtures with 25-watt, 32-volt lamps. These are mounted on the lower deck of the ceiling at the lower deck sill. Two enameled reflectors and sockets are flush in each vestibule hood. These and the body lights are in five lighting circuits.

A 1,500-volt to 32-volt motor-generator set on each motor car gives low voltage current for operating auxiliaries and charges a 32-volt, 300-amp.-hr. Edison storage battery for reserve purposes mounted under the trail car. The charging is controlled by a reversible watt-hour meter. By using 32 volts for the motor control, door operation, signal system and car lighting it has been possible to confine all 1,500-volt wiring except for the heaters to conduit below the floor. Even the watt-hour meter has been mounted under the car and a distant dial actuated by the 32-volt circuit has been placed in the motorman's cab.

Electro-pneumatic multiple-unit control of the General Electric Company PC 103-A type is used. Control cabs located in opposite ends of each unit contain master controllers of the horizontal type, reverser levers, air brake valves, remote-control switches and other operating accessories. The apparatus is inclosed between the front bulkhead and a swinging door, which when opened engages a small swinging panel mounted on the body end panel and thus forms a cab. Six points are provided on the control quadrant, namely, off, switching, series running, full field notching, parallel running, normal field. The control is designed for

automatic acceleration at 1.5 m.p.h.p.s. on level tangent track. Provision has been made for varying this acceleration rate through by-passing the current limit relay. This allows the speed of the control sequence to be controlled independently by successive movements of the master controller handle between notching and running positions. Each movement by-passes the current limit relay one step only.

The master controller has the usual safety handle. Its release opens the main circuit breaker and makes an

the brake equipment, motor control apparatus and the air whistle on one unit.

In the design and construction of the car and its apparatus, including motors, trucks, control and couplers, the local suburban schedule to South Chicago was shown to be that service producing the highest root mean square current to which the equipment will be subjected. For the purpose of computing motor heating, this schedule is figured without coasting between stops. The difference between the actual schedule time and the no-coast time represents speed margin. As much coasting as possible will be introduced into the schedules. Stopping times at the various stations are taken as 18 seconds, with the exception of the first stop at Van Buren Street, which is figured at 25 seconds.

GENERAL DIMENSIONS OF NEW ILLINOIS CENTRAL CARS

Length over buffers.....	72 ft. 7 1/2 in.
Length between pulling face of couplers.....	72 ft. 2 in.
Length over body corner posts.....	60 ft. 7 in.
Length over end sills.....	60 ft. 6 1/2 in.
Length between truck centers.....	47 ft. 9 in.
Width over all at eaves.....	9 ft. 11 1/2 in.
Width over belt rail rivets.....	9 ft. 10 1/2 in.
Width over side sheets.....	9 ft. 9 1/2 in.
Width over platform at vestibule side door.....	10 ft. 6 in.
Height, rail to center line of coupler.....	2 ft. 10 1/2 in.
Height, rail to bottom of side sill.....	3 ft. 7 1/2 in.
Height, rail to bottom of center sill (at truck).....	3 ft. 5 1/2 in.
Height, rail to top of earline.....	13 ft. 4 in.
Height, rail to top of platform.....	4 ft. 3 1/2 in.
Clear opening, body and door.....	4 ft. 0 in.
Clear opening, vestibule side door.....	4 ft. 0 in.
Clear opening, vestibule end door.....	2 ft. 2 in.
Seat spacing, center to center.....	2 ft. 9 1/2 in.
Aisle spacing, at seat ends.....	2 ft. 7 1/2 in.
Aisle spacing, at seat backs.....	2 ft. 0 1/2 in.
Number of cross seats on each side.....	17
Total seating capacity of car.....	84

emergency application of the air brakes. A line relay opens when the line voltage falls below 500.

Tomlinson automatic radial couplers on opposite ends of the unit contain facilities for connecting the 19 wires of the train control and signal circuits and the brake and reservoir air lines. A push-button control allows the motorman to couple and uncouple any desired combination of two-car units without assistance. An interlock with the control circuit prevents operation of the motors in the event the couplers fail to lock. Another feature incorporated in the couplers is the automatic completion of the door signal circuit when the coupler is uncoupled. Adapters are provided for emergency use in coupling the automatic tight-locking couplers with a standard A.R.A. coupler.

AIR BRAKES ARE OF THE ELECTRO-PNEUMATIC TYPE

Electrically controlled air brakes of the New York Air Brake Company's PS type give the trains of 10 cars or less a smooth retardation at a normal rate of 1.75 m.p.h.p.s. This equipment is capable of braking at a rate of 3 m.p.h.p.s. or more with an emergency application. It is designed for the following performance: Electric application of the brakes on all cars simultaneously in any desired degree from light service to emergency when the motorman's valve is placed in the desired position; a pneumatic service application, release and emergency application in the event of failure of the electric control. The service brake cylinder pressure is 60 lb. per square inch and the emergency cylinder pressure is 110 lb. per square inch.

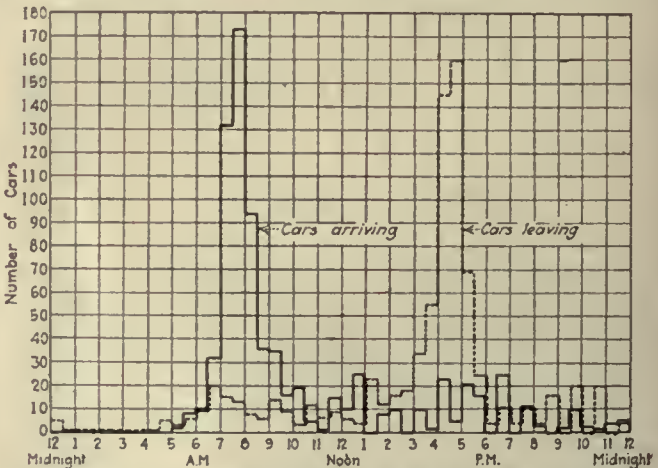
Each motor car is provided with a 35-cu.ft. air compressor driven by a 1,500-volt motor. The governor maintains a pressure of 110 lb. per square inch in the main reservoir, and all governors on a train are electrically connected so that any governor cuts in all of the air compressors. The motors are capable of driving the compressor against a 115-lb. reservoir pressure when the line voltage is 1,350. They are capable of operating 100 per cent of the time, but normally will operate only 50 per cent of the time to furnish air for

Plans for Westchester Traffic

Report by H. M. Brinckerhoff Shows the Need for Present Planning—It Recommends that Suburban Trains Use a Subway in New York City

THE solution of the transportation problem of Westchester County, New York, just north of New York City, lies in operating suburban trains downtown in a subway instead of to the Grand Central Station, according to a report recently prepared for the Westchester County Transit Commission by Henry M. Brinckerhoff, of Parsons, Klapp, Brinckerhoff & Douglas of New York. It is an interim report and considers the needs and the physical aspects of the proposed plan. A further report, devoted in part to the legal and financial problems involved, will be submitted about March 1.

The need for better traffic facilities is shown by the fact that the passengers carried from the territory

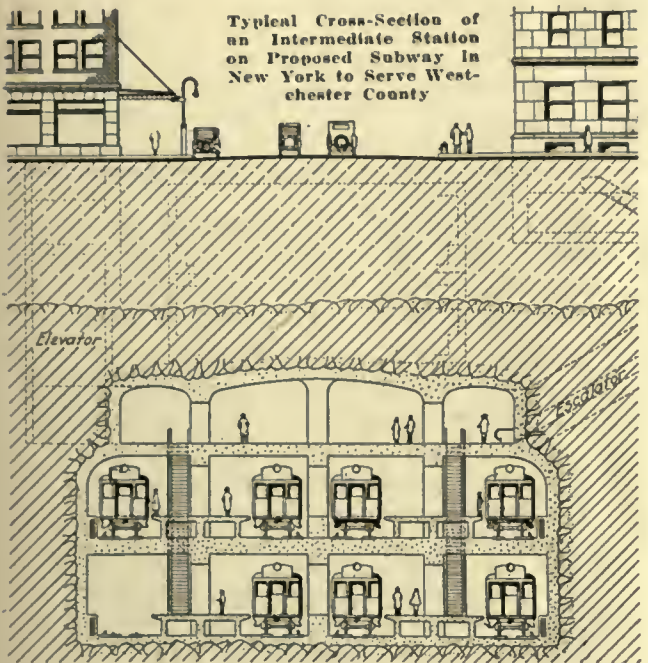


Commutation and Local Express Service at Grand Central Station
This chart shows the number of cars per hour arriving at and leaving Grand Central Station in commutation and local express service on a typical day in September, 1924. The cars are plotted on Eastern Standard time and New York City at this period was on daylight-saving time.

concerned on the New York Central and New York, Westchester & Boston lines and the total figures of the New Haven suburban service amounted in 1924 to about 40,000,000. For the last 10 years the growth on the New York Central lines has been about 8 per cent per annum, and if the new line is built it is estimated that this traffic would more than double within a few years after completion of the line. The accompanying chart shows the number of cars arriving and leaving Grand

Central Station on all suburban lines on a typical day during September, 1924. The chart is plotted on Eastern Standard time, but New York City during that period was on daylight-saving time. The rush-hour peaks are very pronounced, and it will be noticed that the morning peak is higher and somewhat sharper than the evening peak.

The report recommends that the suburban trains of the existing New York Central lines—Hudson River division, Putnam division and Harlem division—together with the New Haven and Westchester & Boston



suburban service, be brought together at a point in Bronx Borough, then passed by subway to a downtown terminal near the City Hall. The junction point recommended in Bronx Borough is at 149th Street, and the subway from that point would pass down Madison Avenue to Madison Square and thence down Fifth Avenue and West Broadway to the lower terminus. It would preferably be four-track on two levels, though cost estimates are also given for a three-track and a two-track subway. The tubes would be carried at a low level to leave sufficient space above for the construction of two levels of city subways of standard type, and the subway would pass largely through rock. The plan contemplates two intermediate stations between the northern and southern ends of the subway. At these stations each track would branch so as to pass on either side of a central platform and allow the trains on that track to berth alternately on opposite sides of the platform. This would increase the time allowable for stops. The station would be reached from the street level by stairways and elevators or escalators, and there would be escalators and stairways between the three platform levels. A typical intermediate cross-section, as proposed, is illustrated.

The suggestion is made that it may be found desirable to carry two of the four tracks from the proposed terminal station near the City Hall west under the Hudson River to reach New Jersey. Certain operating economies would be gained by this extension, but it would involve higher fixed charges.

The estimated cost of the proposed subway ending

near New York City Hall and including a station at that point and two intermediate ones, but exclusive of rolling stock, would be: For a two-track subway, \$95,000,000; for a three-track subway, \$115,000,000; for a four-track subway, \$150,000,000.

Tests Show Two-Motor Trackless Trolley Better

Comparison of One-Motor and Two-Motor Vehicles Made by Detroit Department of Street Railways Under Actual Road Conditions for Wide Range of Speeds and Voltages

THE possibility of trackless trolley operation in outlying areas at an early date led the Department of Street Railways, City of Detroit, to conduct a series of power demand and acceleration tests on two types of trolley buses last summer. These tests were conducted as a preliminary to a traffic investigation which was made in the College Park and Grand River districts, two newly developed tracts in the northwestern section of the city which required transportation. One of these investigations was described in ELECTRIC RAILWAY JOURNAL for Jan. 24, page 129.

The results obtained from these tests, made under the direction of L. R. Wagner, acting electrical engineer, proved of sufficient consequence materially to influence the management in the choice of buses which may be purchased when a trackless trolley line is put into operation.

Heretofore tests made on trackless trolley buses have consisted largely of power consumption, which while of utmost importance do not give all the essential facts required of the bus performance. It is essential to know the starting demand in order to provide adequate power and overhead facilities. As the trackless trolley is used in service having a large number of stops per mile, it is necessary to know the acceleration of the different types of buses, as this has a definite bearing on the schedule speed which the buses can maintain.

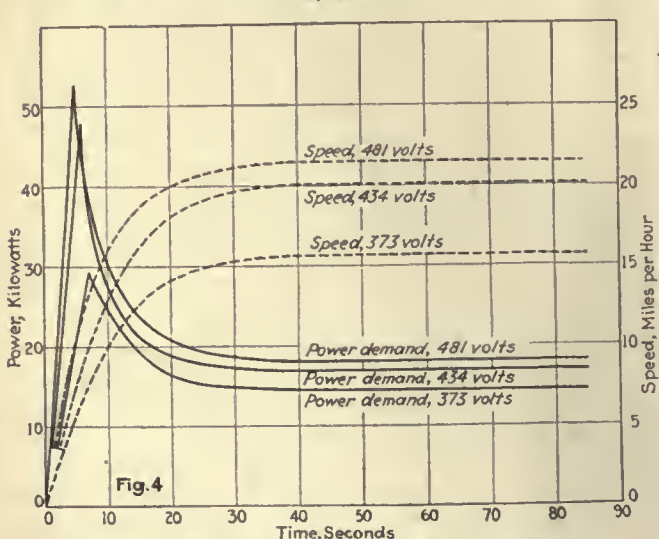
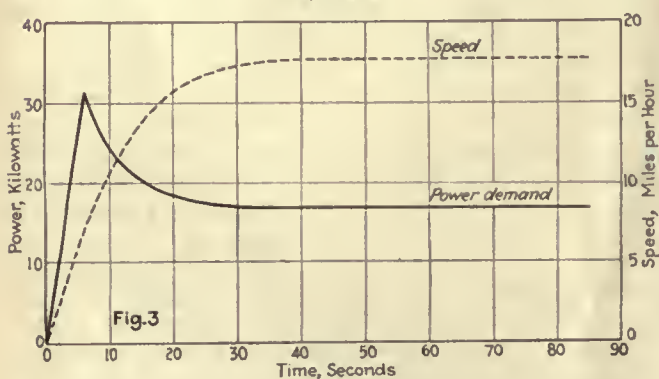
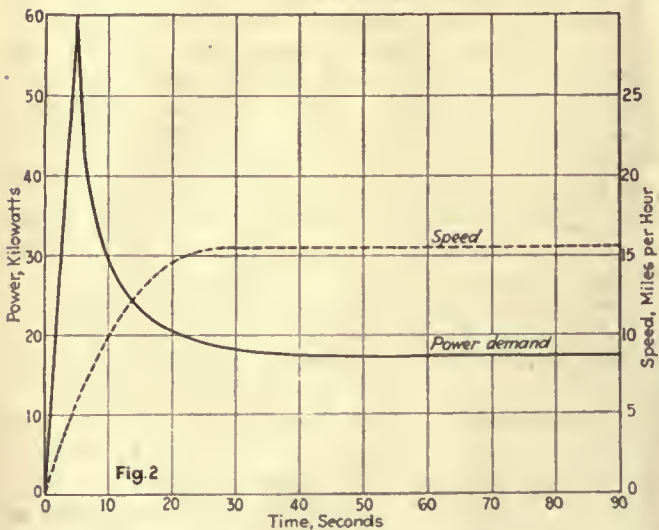
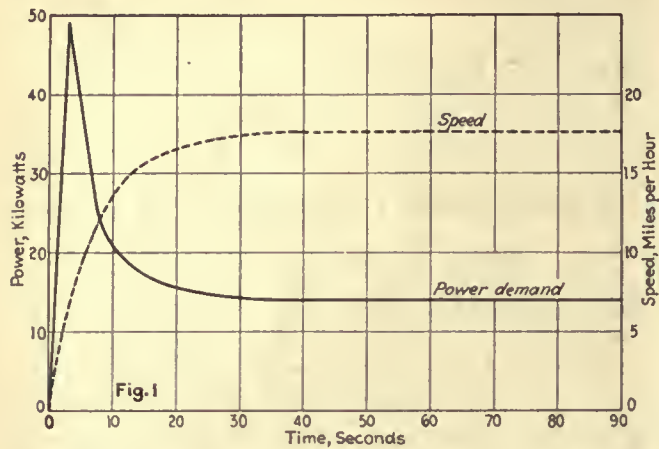
The one-motor bus was a Brill trackless trolley equipped with Goodrich semi-pneumatic tires, weighing 12,000 lb. light and seating 29 passengers. It was propelled by one GE-265 motor (35 hp.) geared 7.85 to 1. The two-motor bus, which seated 28 passengers, was

OPERATING CONDITIONS OF THE FOUR DETROIT TRACKLESS TROLLEY TESTS

	One-Motor Bus		Two-Motor Bus	
Seating capacity.....	29		28	
Tires.....	Semi-pneumatic		Front solid Rear cushion	
Motors.....	One 35 hp.		Two 25 hp.	
Total rated horsepower.....	35		50	
Gear ratio.....	7.85		5.8	
Weight of bus, empty, lb.....	12,000		13,000	
Test number.....	7		3	
Weight of load, lb.....	1,000	9,500	1,200	1,200
Total weight loaded, lb.....	13,000	21,500	14,200	14,200
Average volts during tests.....	492	495	398	481
Average temperature, deg. F.....	70	72	75	75
Type of paving.....	Asphalt	Asphalt	Asphalt	Concrete

built by the St. Louis Car Company and was equipped with Sewell wheels having cushion tires on the rear and solid tires on the front wheels. This bus weighed 13,000 lb. light, and it was equipped with two 25-hp. Westinghouse motors, geared 5.8 to 1.

Five test runs were made on the one-motor bus carrying a load of 1,000 lb. in test crew and passen-



Results of Tests on Detroit Trackless Trolleys
Figs. 1 and 2, equipped with one motor; Figs. 3 and 4, equipped with two motors.

gers. The vehicle was run over asphalt pavement in good condition, being clean and dry during the test. The results are shown in the table and Fig. 1. It will be seen that the maximum power demand was 49.2 kw., while the demand at a free running speed of 17.6 m.p.h. was 14 kw.

A second set of five tests was carried out on the same bus under similar conditions when carrying a weight of 9,500 lb., consisting of the test crew (500 lb.) and 9,000 lb. of cement. In this test, shown in the table and in Fig. 2, the power peak was 60 kw. and the demand at the free running speed of 15.5 m.p.h. was 17.4 kw.

Four tests were made on the two-motor trolley bus on asphalt pavement in excellent condition. The power peak when starting a load of 1,200 lb., consisting of testers and passengers, was 31.4 kw., while the demand at the full speed of 17.7 m.p.h. was 16.8 kw. The results are shown in Fig. 3.

A final series of tests was made on the same bus on a concrete road in good condition, with a load of 1,200 lb. as before. In these tests the trolley potential was reduced, being 481 volts, 434 volts and 373 volts. The peaks for these three voltages were respectively 52.5 kw., 48 kw. and 29.4 kw. The speeds reached for the three conditions of voltage were 21.5 m.p.h., 20 m.p.h. and 15.6 m.p.h., the power demands corresponding being 18 kw., 16.8 kw. and 14.4 kw., as shown in Fig. 4.

The foregoing results show that the two-motor bus was able to reach a speed of 20 m.p.h. at 434 volts, with a maximum starting demand of 48 kw. While the one-motor bus reached a speed of only 17.6 m.p.h. at 492 volts, with a maximum starting demand of 49.2 kw., showing conclusively that with similar voltage the two-motor bus will run at a higher speed, it will have a much more rapid acceleration, and the maximum starting demand will be lower than in the case of the one-motor bus.

Subway for Street Car Passengers

THE lines of the Market Street Railway, San Francisco, Cal., operating out Sloat Boulevard terminate directly in front of the new municipal swimming pool. Automobile traffic makes crossing the boulevard at that point quite hazardous, so the tracks were lowered and a concrete subway built. This permits



Subway at Market Street Railway Terminal Provides Safe Crossing of Boulevard to Swimming Pool

passengers to reach the swimming pool without the necessity of crossing the boulevard. The incline leading to the subway is surrounded on three sides by heavy railing and concrete walks on either side of the tracks make an attractive as well as convenient terminal.

Accounting for Stores

An Outline of the Principles for Keeping Track of Stock and Issuing It
for Use in Repair Work from the Main Storeroom, from
Several Storerooms and Under All Conditions

By *R. A. Weston, C. P. A.*

Special Accountant the Connecticut Company
Formerly General Storekeeper New York, New Haven & Hartford Railroad
and Its Electric Subsidiaries

THE principal requisites for good storekeeping on an electric railway are: System, organization, personnel and facilities. By facilities are meant sufficient space, suitably arranged and located, in which to store and care for the stock of materials that must be maintained to provide for the operating requirements of the system. These stocks are just as truly a part of the company's assets as is its cash, and should therefore be well safeguarded against loss, deterioration, improper use, or use without proper authority and accounting.

The duty of caring for these stocks and of properly accounting for them should not be committed to those who have to do with the use of the material. This principle is now well recognized, and the official designated as storekeeper or general storekeeper should be independent of officials in departments that apply or put the materials into use.

Unfortunately, the importance of the storekeeper's position is generally underrated, and the work is delegated to a man of medium or ordinary ability, with a salary to correspond. This is a serious mistake and one of the reasons why store departments do not function as they should. For this position a man of good caliber should be chosen, one who has had extended experience in this work and can rank in ability alongside of such officials as master mechanics and roadmasters, and his rate of pay should compare favorably with theirs. If the system is a large one, there should be a general storekeeper, in authority over the other storekeepers, and he should rank with other heads of departments. A storekeeper of such caliber will not only see to it that the materials are properly conserved and intelligently ordered, but he will realize the importance of correct accounting and see that it is done. Such a man will also find many more ways to save the company money than a man of medium ability, and the resulting savings would amount to many times the difference in the salary paid.

MATERIAL USED FOR MAINTENANCE OF EQUIPMENT

A rule of prime importance which the system must be arranged to carry out is that material must not be charged to expense accounts until used or about to be used, in order to keep the operating costs and the asset accounts correctly stated. This is somewhat difficult, and in some cases it may not be practicable to comply literally with this rule, but if the facilities previously mentioned are provided, a practical compliance with the rule can be arranged. Theoretically, also, all material should be kept under the physical control of the storekeeper, and issued from the storeroom to the workman, on approved requisition, when and as he requires it to use or apply. It will be interesting now to consider how the conditions vary with respect to

issuing and accounting for the materials required by the different departments. They will be considered in this order: For repairs to equipment, material for power stations and material for the line and track.

The main repair shop of the company is usually the largest customer of the store, and generally the storeroom is located adjacent to it. If the storeroom and the shop are very close to each other there need be no difficulty in requiring that all materials shall be drawn from the storeroom only when and as actually needed. If the storeroom is some distance away, too much time will be lost if special trips have to be made for the smaller and more inexpensive kinds of material. In such a case, a small working stock of such items may be placed in the shop near the work. The list of such items should be carefully made up by the storekeeper and master mechanic, and it should be quite restricted. This stock should be kept labeled and in order by the storekeeper, otherwise the workmen will soon have it badly mixed up.

This stock should not be charged to expense account when placed in the bin but should remain a part of general stores, entirely subject to the control of the storekeeper. After some of the stock has been used and it becomes necessary to replace it, a requisition should be issued for the replacement, and the charge made. It will be noted that this charge is for material that has actually been used and that the working stock in the shops is at all times a part of general stores and entirely under the control of the storekeeper.

There are some materials for equipment repairs that cannot well be handled physically in the storeroom. Among the most important of these are car wheels and axles, both mounted and unmounted. Some difficulty is experienced in properly accounting for them. Almost invariably the shop foreman will care for this kind of stock, and will press wheels on and off of axles and apply them to cars with little reference or information to the storekeeper. It is not uncommon to find the foreman giving the storekeeper a requisition for charging out purposes whenever he takes a new wheel from stock to press onto an axle. However, to make a charge to expense accounts at this time is incorrect, because the pressing of a wheel onto an axle is not a use of the wheel in repair work, but only getting it into a form in which it can be used. The use does not occur until the axle and pair of mounted wheels are placed under a car.

The character of such stock is continually changing. A pair of new wheels mounted on a new axle may be applied to a car, and of those removed one wheel and the axle may be good and the other wheel scrap. The scrap wheel will be pressed off the axle, and a good second-hand wheel may be pressed on and the mounted pair held as a spare in place of the new ones used. In this manner, after a short period has gone

by the character of the stock has very largely changed. Also to be dealt with are steel wheels, cast-iron wheels and steel-tired wheels, and the application and removal of wheels both at the main repair shop and at the outlying operating carhouses.

To do this accounting work correctly there must be a system of charge requisitions and of credit requisitions. In the illustration just given, when the pair of new wheels and the axle were applied a charge requisition would be made out, together with a credit requisition for the pair of wheels and axle removed. In both requisitions, the character, kind, condition and size of both wheels and axles should be given. These requisitions would go to the storekeeper and enable him to make a correct charge and credit. If the credit requisitions are not made, the operating expenses are not credited until the time comes to take an inventory, or to sell the scrap, wheels and axles. This results in a distortion both of the stock account and the expense account, and is the cause of a considerable amount of the inventory discrepancies that have to be periodically adjusted. Some companies keep a wheel record to determine the mileage obtained, and reports are made by shop foremen of wheels and axles changed, applied, removed, scrapped, etc. Another way of handling the accounting would be to have the requisitions for charge and credit purposes made out from such reports in the office where the wheel record is kept.

Other items need special attention with respect to their accounting, such as motor armatures that are being continually removed, rewound and used again; field coils that are impregnated, varnished or painted and reused, and various other parts of equipment that are repaired and again put into use. Again, when cars become obsolete and are scrapped, parts of their equipment, such as air motors, etc., are saved and used in repair work. Often such parts are not turned into the storeroom but accumulate around the repair shops. Usually, the records and the accounting for such parts are poor, and they are not under good control as regards their availability for use at different points.

Closely related to the issue of material for use at the shop will be the issue of material needed for lighter repairs at the outside operating carhouses. All such material should be strictly in the stores account and under the reasonable control and jurisdiction of the storekeeper. This can be treated in a manner similar to the working stock described previously in the case of the main shop, except that the carhouse foreman will need to be relied upon to make the requisition for replenishing the stock instead of the storekeeper. To insure good results, a simple stock book system should be used by the foreman. It need require no book-keeping but simply show that his stock is kept in good order and that a count is made and entered in the book once a month. This, coupled with a monthly visit from the storekeeper or his assistant, will result in this stock being kept at minimum and its accounting well handled.

MATERIALS USED AT POWER STATIONS

The accounting for power station material is often very poor. Usually the station is not located near the shop storehouse, where its materials can have the immediate supervision of the storekeeper. The care and accounting for these materials must be left to the power station engineer, who usually does not maintain

any stock or price records and who will not always describe the material on a requisition in the same way. It is remarkable, too, how frequently in the construction of, and additions to, power plants that proper provision is not made for the storage of supplies and of spare parts. In consequence, the materials are scattered all around the plant in a manner that discourages intelligent ordering and correct accounting.

The remedy would seem to be to provide a suitable storage place, assemble the stock together in order, place it under lock and key, restrict unlimited access to it and place it in the general stores account. Then, if the employment of a storekeeper at the power station is not felt to be justified, the stock can be placed under the jurisdiction of the storekeeper at the shops, who should have help enough so that he can have one of his assistants spend part time at the power station to keep the stock in order and accounted for. Perhaps the care of the power station tools and the stock could be combined, and the employment of a man thus justified.

A system of placing on the larger items in stock the description and cost price of the article, either by affixing suitable tags or by the use of paint, would go a long way to insure the correct pricing and accounting for this material when it is used or when an annual inventory has to be taken.

MATERIALS USED FOR OVERHEAD LINE REPAIRS

Here we will have such materials as poles, crossarms, wire, insulators, ears, trolley frogs, and similar materials for telephone and signal repairs. This work will usually be in charge of a line foreman with one or more crews or gangs and assistant foremen working under him. There will be work cars equipped with working stocks of materials and tools, and the linemen must have headquarters of some sort at which to assemble and start out on their work. A small workshop may also be provided. From this place they must take the materials needed in the day's work, and at the close of the day bring back material not used, also second-hand material and scrap removed from the line.

Often some outlying carhouse, not fully utilized by the transportation department, or some unused power station, will be available for a lineman's headquarters, shop and material storage plant. When such a course is followed, it removes the materials from the care and control of the storekeeper and places them under the lineman. This is open to serious objections from the standpoint of accounting, orderliness and safeguarding of the stock. The storekeeper is out of touch and can control neither the upkeep of the stock nor the accounting. Rather than follow such a practice, sacrifices should be made if necessary, to the end that if it is possible and not prohibitive as to expense, the lineman's headquarters can be adjacent to or near the main shops and the main store and the storekeeper retain full control of the working stock required and the second-hand material and scrap returned. The working stock would then be limited to the work or line cars, which would be replenished direct from the storeroom on starting out in the morning.

A similar plan to that suggested for the outlying carhouse can be followed to control the working stock. It will be necessary, however, for the foreman to maintain a daily record of the material used and turn in a requisition for charging out purposes to the storekeeper

daily. If line poles are received and handled by line-men at points other than the storeyard at the store-room, a careful receiving record must be returned to the storekeeper daily, and the storekeeper should arrange a monthly inventory of poles to keep this rather large item correctly.

If it is not possible to bring about the desired arrangements whereby the line foreman's headquarters are situated near the main store, and an independent and separate storage place has to be maintained, the best alternative would seem to be to place the storekeeper in charge of the stockroom, and the keeping of the stock replenished and in order. He should then have enough help so that an assistant can be on duty mornings when the workmen replenish their car and at night when they return, to learn what their plans are for the following day and what material will be required. This assistant can also take charge of surplus second-hand material and scrap. When he is not at the stockroom, it should be kept locked and inaccessible to the workmen.

MATERIALS USED FOR REPAIRS TO TRACK

Material required for use on the track is different, in that it is large, heavy to handle, and only to a small extent capable of being stored in the storehouse. Track bolts and track spikes may be kept in the storehouse, but usually will be issued by the keg in unbroken packages. Rail braces, tie plates, track bonds and bonding cable, and a limited number of other items can be kept by the storekeeper with his regular stock, but as a rule the rail, the ties and the special work will have to be handled physically by the roadmaster's forces and stored according to his ideas.

The most satisfactory accounting would seem to be in the form of a daily requisition to the storekeeper made by the track foreman or the roadmaster for the materials used each day, and it will be necessary to have frequent check-up inventories taken if correctness is to be obtained. Special work should have each piece painted (and this painting renewed before it becomes obliterated) with a designated "lot" number, and the description should be a matter of record in the store, so that when such material is used or inventoried the lot number will positively identify the material and the cost price.

Facilities are needed for considerable quantities of bulky materials at certain times or seasons, such as sand for stocking cars for sanding track, and track salt, which is used by the carload lot for salting switches by some roads during snowstorms and in winter. Some care needs to be given to the arrangement of this material for accounting and inventory purposes, so that an inspection of it would at any time determine the quantity on hand without handling it.

CARE AND ACCOUNTING FOR SCRAP

It is most important to give the best attention to scrap and salvaged materials, both from the point of view of possible further use and of recovering in cash for scrap sold as much as possible of the original cost. In the case of a trolley road, the large amount of scrap brass, copper and composition, which has in its pound value a very large per cent of its first cost, makes this especially important. Such metals enter into the composition of armature and field coils, trolley wheels, armature and journal bearings, motors, controllers, compressors, car trimmings, trolley wire and

feeders and transmission wire, track bonds and bonding cable, pipe and fittings, and power station electrical machinery, and the value in the aggregate in the course of a year runs up into a large sum of money.

This scrap material should be safeguarded almost as carefully as cash on account of its easy convertibility into cash. A misappropriation is not easily detected, and every practicable means should be taken to safeguard it and to account for it. So far as practicable, a rule should be enforced requiring an old article to be returned to the storekeeper when a new one is drawn from stores. When this is not practicable a good practice is to establish standard scrap boxes around the shops, carhouses, etc., which are always kept locked and in the top of which there is an opening large enough to drop pieces not too large in size, which when once dropped into the box cannot be removed except by the storekeeper. This keeps the smaller scrap out of sight and lessens the temptation to misappropriation.

The storeroom space should also include a scrap room or inclosure in which this class of scrap can be put as it accumulates and where it can be placed in shape for the best market. As fast as it is put into marketable condition by being made clean and free from other material and of suitable size, it is well to barrel it and paint the gross, tare and net weights upon the barrel and report it for sale in this condition. This tends to lessen any opportunity for frauds or connivance between employees and junk men. A copy of these reports of scrap for sale should be sent to the auditor, and his men should check up the material at the storehouses from time to time after it is reported and before it is sold, verifying the weights. From time to time a complete audit of the sales orders issued for the sale of scrap and the shipments of it should be made.

A check should be made from time to time by the accounting department of the weights of scrap of different kinds, as compared with the weight of new material of the same kind purchased, as there should not be too great a disproportion between the two. To illustrate, if a company is going to renew a few miles of trolley wire, it is self-evident that the same number of miles is to be taken down, the larger part of which will be scrapped. The approximate weight of this is determinable in advance, and a system should be arranged whereby the storekeeper will know what he should receive for this scrap. He should then report if it is not received, and the accounting department should also have a system of checking this up.

The scrap accounts are generally based upon estimates, and it is very difficult to estimate such weights closely and correctly. If the more valuable scrap is handled carefully as suggested, it can be weighed as it accumulates and estimates be eliminated. The accounting will then be more nearly correct. If the practice is formed of making out credit requisitions for scrap material when it is removed from equipment, line and track, and scrap accounts are based on these requisitions, accounts will be more correctly maintained than if not.

IMPORTANCE OF CORRECT NAMING AND IDENTIFICATION OF MATERIAL

One of the easiest ways in which wrong accounting for materials may occur is in applying an incorrect price to the article on the requisition slip when the

material is charged out and also on the inventory when it is taken out of store. It is quite feasible to maintain a card or loose-leaf stock record for each different item of material carried in stock. This record should show the prices and quantities received and the quantities issued, thus maintaining a running inventory. Many roads do this, and careful scrutiny of these cards permits of the application of the correct price or of following a system of average prices. These cards are of great assistance in keeping track of stock and guarding against errors in accounting for it, but with the vast amount of detail work in a storekeeper's office and with the class of help usually employed, it is impracticable to check the work on these cards to any very considerable extent and many errors creep in. On account of this, it is not a safe practice to rely wholly upon these cards as a source of information from which to make orders for replenishment of stock, and if this is done, serious and costly errors will result.

Another very good plan is to give each item of material a designating number, which is posted at the bin and placed upon the requisition when the stock is issued. This helps to keep the pricing right in the office, and many roads follow such a practice. The writer would advocate going a step further than this, and follow the department store idea of putting the price on the material itself, so that the requisition may be priced when the material is issued. This would save a large amount of clerical work in the office in the daily accounting work, would much facilitate the taking of inventories and, it is believed, would tend to reduce errors in pricing and accounting. While the writer is not aware of any railways that follow this practice, he is by no means convinced that such a plan is impracticable. Most absurd mistakes are often made in pricing by the clerks in the office who are unfamiliar with the material itself, mistakes which the storeroom man himself who knows the material would not make if it devolved upon him to price the requisition.

ACCOUNTING AT LOCAL OR GENERAL OFFICES

Where is it the most advantageous to carry on the detailed store accounting work, in the office of the local storekeeper, or in the general accounting offices of the company? Something can be said for each side of this question. By assembling the work at some central point and having it done by accountants, making use of modern office appliances, it seems reasonable to believe that more clerks can be eliminated at the local storekeeper's office than would need to be added at the central office, and the work would have better accounting supervision than would be given at the local store and therefore not so many errors would be made. As against this probable saving in payroll needs to be considered the additional office space for workers and for files at the central point and what the same would cost. The storekeeper, being relieved of this accounting work, can give more time and better service in the care and upkeep of stock and in serving the various departments, and probably could better the work done by those departments, though this improvement would not be visible and could not be stated in dollars and cents.

On the other hand, there are difficulties in identifying and pricing the materials when the work is done at points distant from those where the material is located, and questions cannot conveniently be asked of the men who handle and use the material. These objections might be overcome by having the storekeeper

price the requisitions. Another objection that might be stated is that when accounting is done at the store and statements prepared there, the storekeeper can keep in better touch with the value of the material carried and consumed in the various classes, and this is quite important in efficiently conducting a store.

Statements made in the general office are not likely to be available for the storekeeper's information as soon after the period is over as if made in his own office. Adjustments will be made without the storekeeper's knowledge, and statements when received are sometimes not understood and often felt by him to be incorrect and unreliable. The storekeeper will not be in a position to answer many questions likely to be asked by local officials of the other departments, who will be uninformed about costs of work done or material used on certain jobs. It might be, however, that these objections could be overcome by sending back all detailed working papers and requisitions for the files of the local store after the accounts for the month had been stated.

Of course, when the accounting is done locally it would have to be under good supervision, and frequent test checks should be made by the traveling members of the auditor's staff. Just as the traveling auditors are sent out at intervals to check up the cashier who handles the company's cash receipts, so too they should visit the storekeepers and check up their accounting for the materials intrusted to their care.

White Steps Reduce Accident Hazard

FOR the convenience of boarding and alighting passengers, the Altoona & Logan Valley Electric Railway, Altoona, Pa., undertook some time ago to install double folding steps on its high interurban cars in place of the single steps formerly used. This was



The Lower Step Is Painted White to Attract the Attention of the Passenger to the Double Step

described in ELECTRIC RAILWAY JOURNAL for Oct. 18. After this had been done, however, it was found that some confusion resulted, since some cars in this district had double steps and other cars had single steps. These cars are of steel and there was, therefore, no convenient method of installing a step light. In order, therefore, to attract the attention of the passenger to the two steps on the interurban car, the railway has painted the lower steps white. A Kass tread of pressed steel is used. This raises the foot of the boarding or alighting passenger off of the white paint, which retains its color longer than would be the case if the passengers stepped on the painted surface.

Refrigerator Car Is Electrically Operated

The Northern Ohio Traction & Light Company Has Developed a Car with Automatic Electric Refrigeration for Carrying Perishable Products Over Its Interurban Lines

A REFRIGERATOR car equipped with its own electrically operated plant has been developed and placed in service by the Northern Ohio Traction & Light Company, Akron, Ohio. The work of constructing the car began early last fall at the request of the Cleveland Provision Company, with the co-operation of the engineers of the latter company. The car was designed to carry perishable freight over the interurban lines of the traction company. Through the Phoenix Ice Machine Company a new idea was developed quite different from that used in the old kind of refrigerator cars.

The new car is built on the frame of a regular system box car, thoroughly insulated with cork, hair felt, cello-tex boards and insulating paper, properly joined with tar and asphalt. The car is equipped with a Phoenix 2-K unit-type ice machine, a patented cooling tower, endless pipe coils, motors and a thermostatic control. The machinery occupies a space of about 5 ft. in one end of the car. It is separated from the space provided for perishable freight by a solid insulated partition and is reached by an outside end door. The car proper is equipped with regular refrigerator doors and baffle boards are placed inside to insure proper circulation of air.

The thermostat, located in the center of the car, automatically shuts off the motor when the temperature reaches 35 deg. F. and starts it again at 40 deg. By the use of an attachment to the trolley wire the car is at all times under refrigeration, the machines running when required whether the car is moving or standing still. This provides an even temperature at all times, something impossible in the ordinary type of refrigerator car operated by steam roads, as it is necessary to use ice and salt to pre-cool the car and then to replenish the melted ice, along with a proper amount of salt, usually running about 12 per cent of the weight



Interior of the Refrigerator Car. It Is Thoroughly Insulated Against Heat. A Thermostat Near the Center Is Set to Regulate the Temperature



The Ice Machine, Which Is Driven from the Trolley, Maintains the Temperature Between 35 Deg. and 40 Deg. F.



An Electrically Cooled Refrigerator Car that Has Been Placed in Service on the Northern Ohio Traction & Light Company's Interurban Lines

of ice. Re-icing must be done at intervals of from 24 to 72 hours, depending upon the outside temperature and the contents of the car. Between icings the temperature is bound to fluctuate.

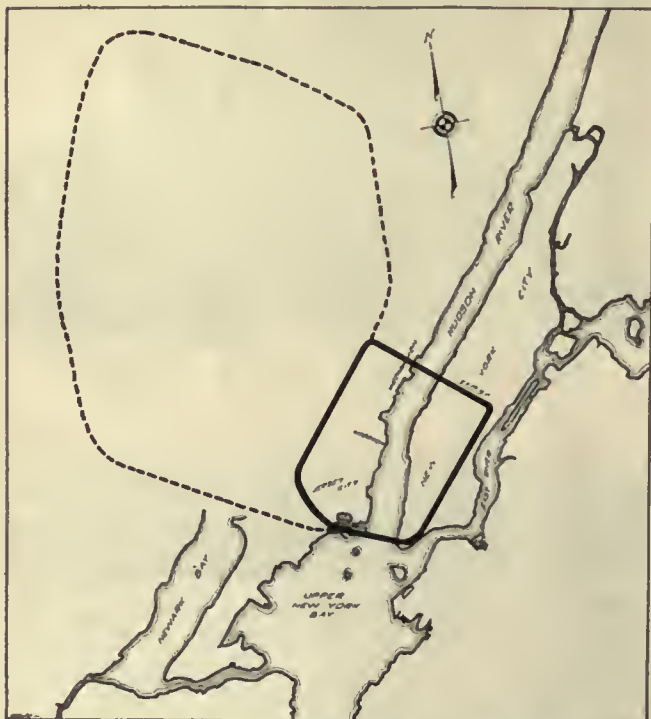
The car will save a considerable amount in the expense of icing. It is estimated by the company that to pre-cool and ice a car preparatory to loading requires about 14,000 lb. of ice and about 170 lb. of salt. The regular railroad charge for ice is \$4 per ton and for salt is 75 cents per 100 lb., making the total cost \$29.26. Cars containing fresh meats must be re-iced each 24 hours with from 1 to 4 tons of ice and a proportionate amount of salt.

The new car will furnish regular Northern Ohio Tracton service for perishable products between Cleveland and stations on its lines. Deliveries with the car will be made over night to all cities and towns served by the company.

Interstate Loop Urged

Preliminary Report Presented by the North Jersey Transit Commission Makes Recommendations on Commuter Traffic

THE needs for better transit facilities to New York from the nine northern counties of New Jersey are set forth in a report presented on Feb. 2 by the North Jersey Transit Commission to the Senate and General Assembly of New Jersey. The report is a preliminary one only, as the data from an extensive



Rapid Transit Loops Suggested by the North Jersey Transit Commission

traffic count conducted Sept. 24, 1924, for 24 hours of all passengers on the steam railroad, the Hudson & Manhattan Railroad and the ferries from New Jersey to New York City have not yet been fully analyzed and tabulated. Enough has been done, however, to disclose the very rapidly increasing traffic on all of these lines, amounting in the last 12 years to 70 per cent in commuters and 65 per cent in all rail passengers.

The report says that the railroads concerned cannot

solve the entire problem unaided and that they should not be asked to do so because the proper solution requires a comprehensive transit system, which will so unite them that passengers on any of the railroads can use a common facility for reaching their destination in New York. The report adds that the present railroad terminals on the New Jersey shore of the Hudson River are wholly inadequate for the growing traffic, as well as too costly for commuter travel, because the area they occupy is needed in the development of commerce.

The report refers to a number of plans for the solution of this problem and recommends, subject to further study, a double loop as shown in the accompanying map. The loop shown by the solid line would connect all of the railroads of northern New Jersey at points some distance back from the river. The New York section would be a subway, passing through the business sections of the city, and preferably of such size as to permit the operation of standard railroad rolling stock. When the railroads connecting with this loop are electrified, through trains can be run on them and around the loop. The report also suggests that the subaqueous tunnels be so constructed as to serve as combined vehicular and rapid transit tunnels, like that proposed under the Mersey River at Liverpool.

The dotted line on the map is a supplemental loop designed to serve the most densely populated district in northern New Jersey.

Encouraging Travel to Reservations

TO FACILITATE the use of its service by visitors to the famous Blue Hills state reservation, the Eastern Massachusetts Street Railway has mounted a timetable and map of the reservation on a bulletin board at an important highway crossing with its Brockton-Mattapan line, as shown in the accompanying illustration. Foot passengers through the reservation entering from another side find this electric line convenient after a walk of several miles through woodland country, and the presence of the timetable with its specific information as to the arrival and departure of cars contributes to increase the patronage of the railway.



Reservation Map Combined with Trolley Timetable Increases Traffic

Safety Slogan Prominently Displayed

THE familiar safety slogan "Watch Your Step" is displayed on the cars of the Harrisburg Railways in such positions that boarding and alighting passengers can hardly fail to see it. This phrase is painted in yellow letters on the riser between the folding step and the platform floor. When the step is folded up the legend cannot be seen, but when the step is down for passengers to board the car, the yellow lettering is very prominent. To caution the alighting passenger, the warning has been painted on the sand boxes on the two platforms.

P-O Builds New Freight Terminal

Double-Track Yard with Freight House, Loading Platform and Team Area Is Located in Business District of Youngstown—Facilities Are Provided to Handle Double the Present Business—Connections with Electric Railways in Michigan and Ohio Increase Scope of Pennsylvania-Ohio Service

By R. M. Graham

Manager of Railways Pennsylvania-Ohio Electric Company



Modern, Fireproof Freight Terminal Is Located in Heart of Youngstown, Serving Conveniently the Retail and Wholesale Business Districts

MODERN freight-handling facilities have been provided at Youngstown, Ohio, by the Pennsylvania-Ohio Electric Company, in a new freight terminal house and yard. On Nov. 3, 1924, the freight department of the interurban line was moved into its new quarters, which for some time previous had been under construction. The outstanding feature of this new development is the central location of the terminal. It is less than three short blocks from the central public square of Youngstown. Furthermore, it is situated in the heart of the retail and wholesale business section of the city. Notwithstanding this central location it is easily accessible to both trucks and cars.

The terminal property extends entirely through the block from Boardman Street to Front Street and has a width of approximately 100 ft. Since these streets are important arteries of the city, the terminal is readily accessible from all directions. From the standpoint of the railway operation it is most convenient. A spur track from Boardman Street enters directly into the yard. The company's main storeroom is readily accessible, as is also the office building, located on adjacent property.

In this desirable location the company has built a double-track freight yard with a reinforced-concrete platform and fireproof warehouse along one side and a wide teaming area along the other side. This area is used by trucks delivering and calling for shipments. To facilitate further the handling of freight, all traffic into and out of the terminal is on a one-way basis. The entrance is from Boardman Street and the exit into Front Street. This prevents congestion and con-

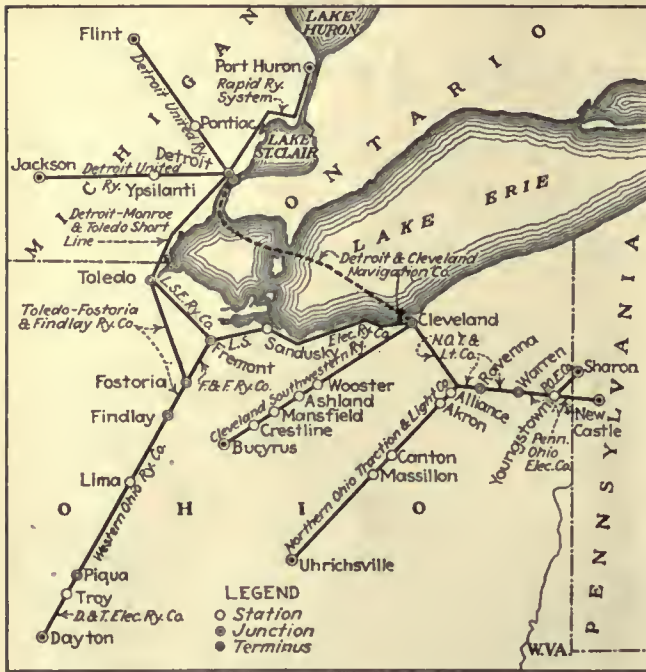
fusion and reduces the time the trucks and teams are at the terminal, which is an important consideration for shippers and receivers.

Reinforced concrete is used in the construction of the platform. It is of the proper height for unloading freight cars and for handling shipments to and from trucks. To the rear of the platform, which has a depth of approximately 10 ft., is the freight warehouse. This is a single-story shed, extending from the rear of a four-story building on Boardman Street to the freight office on Front Street. It is of fireproof construction, having sheet-steel walls and roof, the product of the Truscon Steel Company at Youngstown. The offices of the freight agent are at the Front Street end of the terminal, in a brick and stone extension of the warehouse. This location is convenient for the handling of bills of lading as the trucks are ready to leave.

EXTENSIVE FREIGHT CONNECTIONS

The main freight business consists of through shipments over connecting lines from and to Cleveland, Toledo, Akron, Canton, Detroit, Findlay, Lima and other Ohio and Michigan points. Practically all this freight is sent through at night on trail cars. Three or four-car trains are brought into the terminal at night and their contents distributed throughout the day. During the day, trailers are loaded preparatory to being removed the following night. Over-night service is given to Akron, Canton and Cleveland and intermediate points. Forty-eight hour service is given to all other points reached by a connecting line.

In 1918 connections were made with the Cleveland,



Many Important Freight Centers Are Reached by P-O System
 Freight service offered by the Pennsylvania-Ohio System and connecting lines, includes principle cities in Ohio, Michigan and Pennsylvania. Copies of this map were used to advertise the service.

Alliance & Mahoney Valley Railway at Warren, Ohio, but the area served was small and the business handled did not show much increase. Following this, however, connection was made with the Northern Ohio Traction & Light Company, whose lines reached Akron, Cleveland, Urichsville, Canton and other important towns. The business received at first was small, but the fast over-night service to and from these points was soon appreciated by shippers and receivers of freight in Youngstown. This resulted in large freight trains being handled daily by this joint operation.

Still striving to increase business, other connections were sought and arrangements made for the handling of interline freight to and from the Detroit & Cleveland Navigation Company in order to reach Detroit. This was highly desirable in view of the fact that Youngstown produces many articles used in the automobile

industry. Connections were then made with the Lake Shore Electric Railway, with lines extending from Cleveland to Sandusky, Fremont and Toledo. More recently, connections have been made with the Western Ohio Railway and the Dayton & Troy Electric Railway, which connects with the Western Ohio and operates into Dayton. Arrangements are now being made to connect with electric lines serving Detroit, Flint and Jackson, Michigan and points southwest of Cleveland. The accompanying map illustrates the scope of the freight service given through the connecting lines.

Dependability is the watchword of the Pennsylvania-Ohio system in handling freight shipments. The completion of the new terminal has overcome the handicap of lack of facilities under which the company previously labored. It is thought that the new facilities will permit the volume of freight to be doubled. This fast service has been recognized as a real asset to the merchants and industrial plants of Youngstown, as it permits of their carrying small stock, knowing that they can depend upon fast electric freight to handle their consignments without delay. The effort is being made not only to reduce complaints to a minimum, but to make the carrying and delivery of such freight as is intrusted to the company so completely satisfactory that it will more than fulfill whatever expectations may have existed in the minds of the customers.

A noteworthy feature of the new freight terminal is the extraordinary illuminating effect which the company has worked out in connection with it. Large painted signs on the east side of the Boardman Street building are illuminated with a battery of five lights installed on the roof of the office building across the areaway from it. The signs on the south side of the building are illuminated by four projectors installed on the roof of the freight shed. Similar signs on the west side of the building are illuminated by four Western Electric "X"-ray projectors installed on poles. The prominence of the building and its situation is such that it can very readily be seen from a large portion of the city. This extraordinary illumination of the building and its signs renders it a conspicuous feature of the landscape. In addition to these signs, the company also makes general use of billboards in advertising this convenient and attractive service.



The Loading Platform Extends the Length of the Fireproof Sheet-Metal Warehouse and Is Served by a Double-Team Track

Electric Derail Protects Bridge Crossing

Derail Controlled by Approach of Car Replaces Hand-Operated Type on Chicago Surface Lines—Operation Interlocked with Movement of Bridge—Experimental Installation to Be Forerunner of Others

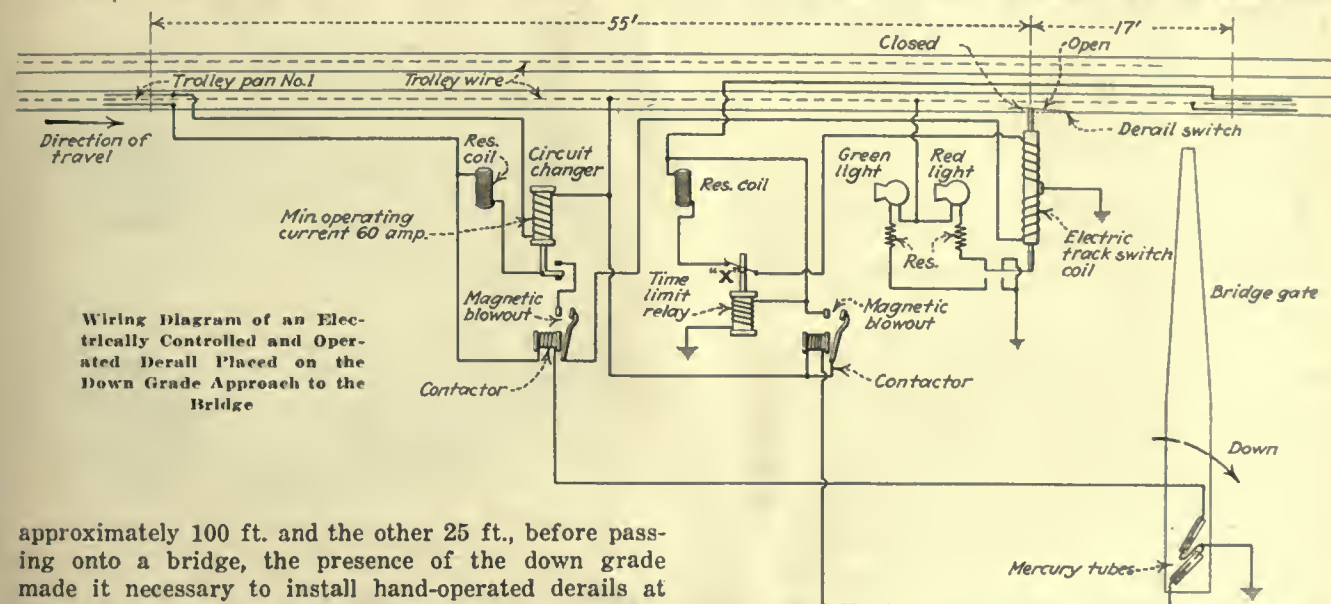
AN ELECTRICALLY operated track derail, controlled by the approach of a car and interlocked with the movement of the bridge, has been installed recently by the Chicago Surface Lines on the south-bound track at the Wells Street bridge approach. This experimental installation replaces a hand-operated derail formerly in use at this point. If the new type of derail stands up under the severe service, the company plans to replace five other hand-operated derails with the electric type.

Of the many bridge approaches on the Surface Lines, only six are on a down grade. Although a city ordinance requires all cars to make two stops, one

Two signal lamps are mounted on the elevated structure overhead near the derail. Each signal consists of a lamp box with shaded lens, one green and the other red. When the derail is open the signal shows red, this being the normal position of the apparatus before the car passes the first pan. When the switch is thrown to straight track position, the green signal is lighted.

By interlocking the action of the derail with the movement of the crossing gate protecting the entrance to the bridge, it is possible to prevent a car from going on the bridge when it is open or about to open. This is accomplished by connecting the switch control circuit through two mercury contact tubes mounted on the gate.

As will be seen from the accompanying wiring diagram, one of these tubes is so mounted that when the gate is raised, contact is made through this mercury tube, allowing the derail to be operated by means of the two trolley pans. However, when the gate is lowered the other mercury tube closes the contact, which throws the derail into the open position if it is not already in that position. At the same time



approximately 100 ft. and the other 25 ft., before passing onto a bridge, the presence of the down grade made it necessary to install hand-operated derails at these six bridges as an additional safety precaution. The derail is located between the two points where stops are required. It was necessary to have a switchman on the job 16 hours of the day to throw the hand derail in front of each car. This required the services of two men for each derail. During the remaining 8 hours of the night, the conductor on each passing car threw the derail. The electric derail dispenses with the services of the two flagmen and also eliminates the hazard of having the conductor cross the street at night through the vehicular traffic.

As the company was unable to obtain the desired type of derail complete, it was necessary to utilize available electric track switch equipment. A solenoid operated switchpoint is used with control similar to that employed in track switches. One two-plate contactor is located 55 ft. in front of the derail. A second trolley pan is located 17 ft. beyond the derail. The first is electrically connected to the solenoid of the derail so that the motorman must pass with power on, in order to throw the derail to the straight track position. When the car passes the second pan, whether with power on or off, the derail is thrown to open position.

the contact in the first mercury tube is opened, preventing the operation of the derail by the first trolley pan. As it is necessary for the bridge tender to lower the crossing gate before he can raise the bridge, the derail is thrown into the open position some little time before the bridge is raised. This requires an approaching car to stop before the bridge actually begins to raise and avoids any possibility of accident.

The locations of the pans, signals and derail are such that the operation of the derail fits in with the transportation department's operating rules. The motorman stops his car approximately 125 ft. before the bridge at the top of the down grade. Just beyond this point is located the first trolley pan which must be passed with the power on. The motorman notes the change in position of the derail by watching the switchpoint or the signal light. After passing the derail and the second pan, it is necessary for the motorman to bring his car to a full stop before going onto the bridge. Thus the whole operation makes the motorman watchful and careful in approaching the bridge.

A few changes were made in the standard switch equipment in order to adapt it for this special installa-

tion. Two magnetic blowout contactors are used to take the heavy arc in the control switchbox which is located on an adjacent trolley pole. A new type of solenoid track switch made by the Cheatham Electric Switching Device Company is used. The ordinary operation is reversed, as this switch is set for straight track by applying power. A time-limit relay protects the electrical apparatus should a car stop with the trolley wheel on the pan. This relay is set for 5 seconds and is brought into play if a car is blocked by the bridge. However, the relay is reset automatically when the car clears the pan.

This initial installation of bridge protection has been in operation since Sept. 21. For the month of October, the derail was thrown approximately 30,000 times without a failure.

Railway Makes Concrete Poles in St. Louis

Reinforcement Has Been Arranged to Provide Adequate Strength Where the Strain Is Greatest and Eliminate Excess Metal in Other Places—Steel Hoops Hold Reinforcement in Place

BY C. L. HAWKINS
Engineer of Way and Structures
United Railways of St. Louis

THE United Railways of St. Louis for the last four years has been using reinforced concrete poles to replace defective wooden poles. At present approximately 100 concrete poles are placed per year, although a total of more than 1,000 have been installed on the system.

The success of the concrete pole depends, to a great extent, upon the position of the reinforcing bars and the care taken in placing them. An accompanying illustration shows the arrangement adopted by this company. Steel reinforcement consisted of deformed bars which are rerolled by the Laclede Company from rail steel. Corner bars are of $\frac{5}{8}$ -in. square section, while the intermediate bars are $\frac{1}{2}$ in. square. As the greatest bending moment occurs between 4 ft. and 14 ft. from the bottom of the pole, three intermediate reinforcing bars have been placed on each side of the pole in this area. The reinforcing rods are held in place by $\frac{1}{4}$ -in. round steel hoops. In the section where the greatest strain comes these are spaced 6 in. apart, but elsewhere they are 12 in. apart.

The standard pole is 35 ft. long with a base 12 in. square and a top 6 in. square. The corners are beveled, but sufficient concrete has been left to insure a thickness of 1 in. between the outside edge and the nearest of the reinforcing rods. Elsewhere the rods are approximately $1\frac{3}{4}$ in. from the outside.

The concrete mixture used is 1:1½:3. Gravel graded



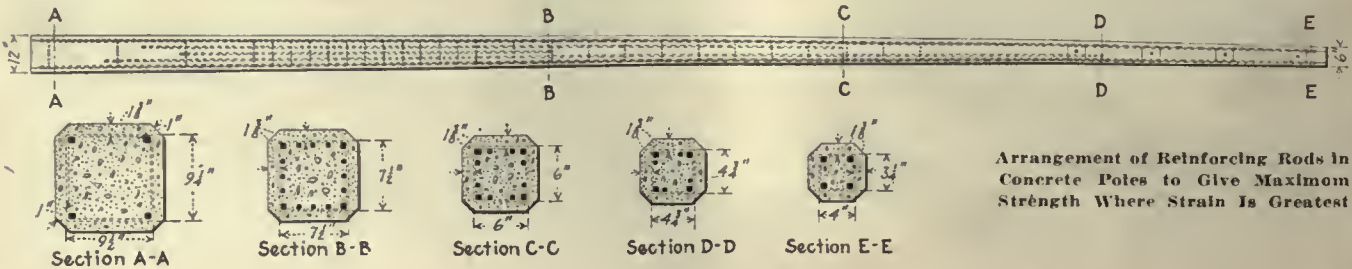
Concrete Poles of This Type Are Being Installed at the Rate of Approximately 100 per Year



Method of Storing Concrete Poles in the Yard of the United Railways of St. Louis

down from $\frac{1}{2}$ in. size is used in the aggregate. It is thought that a coarse concrete would be bad for this purpose, as it would permit the reinforcing rods to rust. Concrete is poured into the mold fairly dry, in order to obtain the maximum possible strength in compression. The care taken in the manufacture and handling has almost eliminated defective poles.

Driving one of the buses is considered the best job in London for the unskilled workman. A 6-day week minimum is guaranteed and the earnings are about £5 a week for a driver and £4 for a conductor, with an average of about £1 a week extra for overtime.



Automatic Doors Relieve Jim Crow Problem

Several Months Experience in Dallas with 20 Cars
Equipped with Rear-End Automatic-Exit Doors
Has Led to Extension of Their Use

BY RICHARD MERIWETHER

Vice-President and General Manager Dallas Railway

DURING the late spring of 1924 the Dallas Railway started to equip 20 double-truck cars for one-man operation by installing safety devices, pneumatic door engines and a treadle-operated rear-exit door. Six of these cars were placed in service in September, on the Munger-Highland Park line, and by Oct. 1 the line was completely equipped with 20 of these cars. This route is 8 miles in length and has a 5-minute headway during the peak hours and a 10-minute headway during the remainder of the day.

The distinctive feature of the cars is the rear-exit door, which is controlled by a treadle set into the platform floor in front of the door. When a passenger steps on the treadle the door opens. It then closes automatically as soon as the step is clear, unless in the meantime another passenger has stepped upon the treadle. The mechanism is interlocked in such a way that the door will not open until the brakes are fully applied, and the car cannot start until all doors are closed.

This automatic rear-exit door was installed because passengers objected to one-man operation on account of having to crowd through the aisles to the front exit. Dallas being a Southern city, this condition was particularly objectionable. The "Jim Crow" law is in effect here, and requires the negroes (who constitute some 20 per cent of the population) to be seated in the rear of the car. White passengers objected strenuously to the negroes crowding through the aisle to leave the car at the front, and the rear-exit door offered the means of completely eliminating the cause of complaint. Furthermore, it is a great convenience to white passengers, who may also leave by the rear door when the front end of the car is crowded.

Service has been materially speeded up by the automatic rear-exit one-man car; in fact, the cars being used in Dallas have demonstrated that they can handle the



When the Last Alighting Passenger Clears the Step the Rear Exit Door Automatically Closes

traffic quite as rapidly as two-man cars. The schedule on the line now being operated with these cars is the same as when two-man cars were in use. Another feature which enhances the value of this automatic door arrangement is a key valve, so located that the rear door may be opened with a key by street fare collectors stationed at the most important downtown corners.

ANSWERS ONE-MAN CAR CRITICISM

The Dallas Railway is a pioneer in the development of the rear-door treadle exit for one-man car operation. The arrangement has proved so satisfactory that the company is proceeding to change over 20 additional double-truck cars in the same manner as the first lot, and hopes to have, within a reasonable period, not less than 100 cars equipped with the rear-door treadle exit. The arrangement has completely answered all the adverse criticisms from patrons of the Dallas Railway on one-man car operation, and the management is elated at the reception they received from the public.



Double-Truck Cars Converted for One-Man Operation Are Run on the Same Schedules Formerly Operated with Two Men. Automatic Rear-Exit Door Is Interlocked So Car Cannot Be Started Until Doors Are Closed

Association News & Discussions

The Business Paper of the Future*

What It Needs of Its Industry—What It Can Do for Its Industry—
Assistance Which It Can Give in Reducing Production Waste
and Distribution Waste

BY JAMES H. MCGRAW
President McGraw-Hill Company, Inc.

BEFORE launching into consideration of the future, it would be well if we agree upon the fundamental characteristics of the business paper.

It is, first, a merchant of ideas. Like unto the great merchants, like Marshall Field and Wanamaker and Tiffany, it delves into the far corners of this country and of the world for the best merchandise—the merchandise, in this case, of ideas—assembles it in one place and displays it attractively for its customers. While delving into the corners of its field it shares in the counsels of the mighty, and in the noon-time exchanges of experience of artisans, mechanics, salesmen and saleswomen. It becomes close brother of all who work in industry and trade.

At the same time its obligation is to the whole group rather than to individuals. It sits, therefore, as a judge. Business passes in review before it. It is of the industry but not immersed in its details. It is judge, counselor, sympathetic critic. Its duty is to advise, to warn, to encourage, to applaud.

Sitting on the side lines as judge and counselor, it becomes co-ordinator as well. With responsibility to the whole group, it brings into unity of action those working at cross-purposes. Its function is to make all forces in a branch of business bear in the same direction—and that direction the right one. The business paper, therefore, is information bureau, teacher, friend, philosopher and guide, of industry and trade.

The question before us now is this: What can the business paper accomplish in the future? What demands will come upon it and how will it meet them?

To speak with absolute certainty about the future is given to no man. We can only estimate the probable continuation of trends that are discernible today. To tell what the business paper of the future will be, we must seek the trends in business that are so fundamental that they are likely to persist. Are there such trends? And if there are, whither do they lead?

In the first place, business will continue to enjoy, for one if not for more generations, the marvelous growth of the last 50 years. There are no signs of loss of virility in American industry and trade; rather there is increase in capacity, initiative, courage and en-

ergy. There is not such serious diminution of natural resources as to cause an early slowing up. In consequence, business will become more complex, its problems larger and more difficult.

In the second place, the American people, having tasted of high standards of living, will demand still higher standards, requiring the constant increase in the purchasing power of the wage dollar. This will require greater efficiency in industry and trade—which means the elimination of waste, and will, in the race for public favor, make the competition of the future more severe than that of the past.

What influence have these trends upon the business paper?

WEIGHTIER PROBLEMS

It should be apparent that a business of greater volume and greater complexity, carried on in larger units and by larger organizations, will confront business men with problems weightier and more difficult than in the past. They will need for their solution more knowledge, wider experience, keener analysis, more reliable conclusions, more courageous plans, more decisive and effective execution. If the business paper is to play worthily its part it will have to deepen the wisdom, broaden the experience and strengthen the courage of its staff that it may bring to these business men knowledge and counsel and warning measuring up to the weightiness of the new problems.

In numbers our larger papers are now well staffed. The need will be not for more men, but for better men; men who can gain the confidence of the big business men of the future, and having gathered the best of the experience of leaders and made it their own, can command the respect and following of the field for whatever of counsel and warning they may give as a result of their judgments.

The second of these trends demands that we shall continue to increase efficiency in business—which means to eliminate waste. Much has been done in this direction, particularly in production. So far have we gone, in fact, that, save for new technical discoveries, further progress in individual effort will be slow. But vast areas of waste elimination remain that can be reclaimed by collective effort, particularly in the field of distribution of goods and commodities.

In this collective effort in waste

elimination we have made valiant beginnings. The great technical societies, by their standardization, test and specification work, and the trade associations have eliminated much wasteful practice. The admirable methods and efforts successfully applied in engineering and production need to be extended to every phase of business. It is one of the many contributions that Mr. Hoover has made to our material progress to point out these new areas for collective effort and to do it so dramatically that American business is putting a new emphasis on their study.

In this work, the business paper of the future can play a large part. It has always been a great co-ordinator. No agency has been responsible for the formation of more trade associations and technical societies than business papers, and no agency has done so much to spread a knowledge of their work and to secure acceptance thereof. Efforts of this kind will assume a greater importance in the future.

WASTE IN DISTRIBUTION

Of this area of waste elimination one part—that in distribution—looms up as the largest problem before American business today. The spread between production cost and the price paid by the consumer is far too large. Collective attack, as Mr. Hoover has insisted, alone holds possibility of large results. Wastes in transportation, in inefficient hauling and loading; wastes in deterioration of commodities; wastes in disorderly marketing, with attendant gluts and famines; wastes in too many links in the distribution chain; wastes in bad credits; wastes through the "competition of ignorance," by those who do not know their costs and the fundamentals of the business in which they are engaged; wastes in not knowing the markets in which one can sell economically; wastes in not knowing the buying habits of private and of industrial consumers; wastes in using wrong channels of approach to prospective buyers; wastes in advertising and selling by using appeals that have no power to influence the prospect.

What part can the business paper of the future play in this study of distribution?

Just as large, I answer, as the capacity of its publishers and editors and advertising men. It is in a strategic position. It is the confidant of industrial and trade leaders. Eagerly they will give of their views and experiences, eagerly will they accept help, so long as it be intelligent, stimulating and sound.

I do not mean that the business paper can by itself study the whole problem. It can, however, stimulate and co-ordinate, point out the new fields for investigation and hammer home the discoveries made until they are gen-

*Abstract of address at the annual meeting of the New York Business Publishers' Association, New York, N. Y., Jan. 27, 1925.

erally accepted and put into effect. It can, too, it must in fact, be itself an authority on selling methods, so far as they touch its own field. How else can it dispose of its own goods—advertising—in the spirit of modern selling, that spirit which is to “service,” rather than “sell,” the product to the consumer? We must be experts not only in advertising, but in the channels of distribution and sales methods that will be effective for our clients.

SUPERIOR SERVICE DEMANDED

I referred previously to the increase in severity of competition as another of the results of the effort to raise the standards of living. This tightening of competition will create a new hunger for facts, for data leading to economics, for searching inquiry into the best practice.

I have frequently heard publishers and editors say that they could not hold this or that type of influential subscriber, that the renewal rate in desirable branches of the field was inordinately low. There seemed to be an implication in their tones that the prospective reader was at fault. But the fault lies in ourselves. Why should the reader buy our wares if they are unsound, stale or commonplace? He needs help, but the help must be real. If we will but get to the bottom of the problems of our fields and have the ability to take the leadership in their solution, we shall have no cause to complain of failure to get and hold influential subscribers.

CIRCULATION WORK

The same sort of research that I described for the editorial and advertising departments is needed in circulation work, as well. Our inquiry must start with a thorough knowledge of our field. It must proceed to a picking of those who can profitably use our paper, and then to a concentration of selling effort to put these names on our subscription lists. Finally, it must include a thorough survey of the influence of these subscribers, their buying habits, their buying or specifying power, the channels for approaching them and the appeals that are valid.

In other words, hit or miss in circulation will not avail, nor will even the building up of sound circulation. There is needed, as well, thorough knowledge of what that circulation can do for the advertiser.

OUR RESPONSIBILITY TO SOCIETY

I want, in closing, to leave a thought regarding our broader responsibility. We as business publishers owe our primary responsibility to the business, to the industries and commerce, of America. But eventually our accountability, as well as that of business itself, is to the whole American people. Viewed in this light, the business paper is a great social force. It has ever stood for economic and governmental sanity, but its counsel will be more needed in the future than in the past. Many agencies of information—news-papers, magazines, associations, even some of the colleges—are veering with each erring wind of public fancy. It is all the more important that the business press fight without tiring for economic

and governmental soundness. It should stand for enlightened business policy—for fairness to the owners of business, to the employees and to the public. It should urge that business men think rather of their responsibilities than of their rights.

It should above all, stand for the principle of individualism in American life, making the sole reservation that that individualism shall not transgress the rights of others. It is upon this individualism that our social structure rests. If today our people enjoy the highest standards of living of any

people on the globe, if they are better fed, better clothed, better housed and have more of the comforts and luxuries of life, it is because of the stimulus afforded by the individual initiative and risk on which our business is founded. A nation committed to individualism will conserve the foundation of liberty on which our government rests.

To stand for principles such as these, to champion them in the interest of the whole people and the integrity of our system of government, is the inestimable privilege and the solemn obligation of the business publisher.

American Association News

Mr. Brush to Address Midyear Meeting

M. C. BRUSH, president of the American International Corporation, has just accepted an invitation to be one of the speakers at the banquet of the Midyear Meeting of the American Electric Railway Association. Acceptance of the invitation by Mr. Brush was gratifying to the association executives because not only is he an old-time electric railway man, but he speaks his mind plainly, as it is hoped all of the Midyear Meeting speakers will do.

Other speakers who have accepted for the meeting include Gen. Guy E. Tripp, J. G. Barry, George E. Hamilton, Peter Witt, S. B. Way and Commissioner John Esch.

President Shannahan has extended invitations to the chairmen and members of public utility commissions, as well as other governmental officials, to attend the meeting, which will be held in Washington Feb. 17. The present indications are that this will be one of the most successful Midyear Meetings in the association's history.

Reservations for hotel rooms and the dinner are coming in fast, association headquarters reports.

The transportation committee, under the direction of E. C. Faber, chairman, has divided the country into sections and every member of the association has received a personal letter from a member of the committee setting forth the attractive features of the Midyear session. Barney Frauenthal and H. J. Kenfield have sent out special folders in the St. Louis and Chicago territories, respectively, boosting the meeting.

Meetings of the manufacturers' committee on co-operation and the directors of state committees on public utility information have been called for Monday, Feb. 16.

New Publicity Material

THE manufacturers' special committee on co-operation of the American Association, of which E. F. Wickwire, vice-president Ohio Brass Company, is chairman, has just opened up a new publicity channel for telling the electric railway story. A special label, or dodger, of the size used in the theatrical business for “sniping” has been prepared and distributed for stick-

ing on freight and express shipments. The idea is based on a conviction of the committee that there isn't half enough reading matter around railway stations and that any label which shows its face around a depot is certain to be read. Therefore this sticker is headed “I'm a Railway Man.”

The complete text is as follows:

“I'm a Railway Man. I make electric railway supplies. More than 300,000 of my buddies throughout the United States do the same thing. This package contains some of the supplies I made. A square deal for electric railways means a square deal for us.”

The label carries the picture of Bill Ernst, whose face has been on other electric railway publicity material. He is a worker in a manufacturing plant, is good natured, looks genial, and likes his work.

Special Reports Available

THE following special reports have been prepared by the bureau of information and service of the American Electric Railway Association and are available to member companies in good standing upon request:

Bulletin No. 6—Public Utilities Securities Issued in 1924.—A list of the new securities issued in 1924 divided between electric railways and other public utilities showing the type of security, amount issued, maturity date, interest rate and offering price. The list is preceded by a cumulative table comparing the amounts of securities issued in 1924, 1923 and 1922.

Bulletin No. 7—Trend of Trainmen's Wages.—Shows for a large group of companies maximum wage rate; the number of years of service necessary to reach it and the number of trainmen employed for the years 1914 to 1924 inclusive, and the same information as of Feb. 1, 1925.

Bulletin No. 8—Trend of Electric Railway Fares, 1917 to 1924.—This shows the fares in effect in each of the 288 cities having a population of 25,000 or more each year from 1917 to 1924. In addition it shows the average cash rate of fares in these cities in these same years, and the number of cities in which each rate of fare was in effect in each of these years.

Bulletin No. 9—Toll Bridge Rates.—Gives summary of the information obtained in the replies to a circular letter of inquiry addressed to members on the subject of toll bridge charges, and covers charges paid by electric railways for the use of bridges and the schedules of charges for other users of the bridge levied by electric railways owning and operating toll bridges with a statement of the operator's views as to the proper basis of fixing charges on toll bridges.

In addition to the above, supplements to the Wage Bulletin, Fare Bulletin and Cost of Living Studies (Bulletin No. 10) have been prepared bringing them down to date.

Maintenance of Equipment

Pull-Ins Reduced on Southern Properties

THE number of cars pulled in during the year 1924 has been reduced materially for the properties comprising the Electric Railway Association of Equipment Men, Southern Properties. A record of pull-ins showing the average car-miles for the year up to and including September was published in the ELECTRIC RAILWAY JOURNAL for Oct. 25, 1924. The complete record for the year, now published, shows the average car-miles per pull-in which is chargeable to the carhouse as varying from

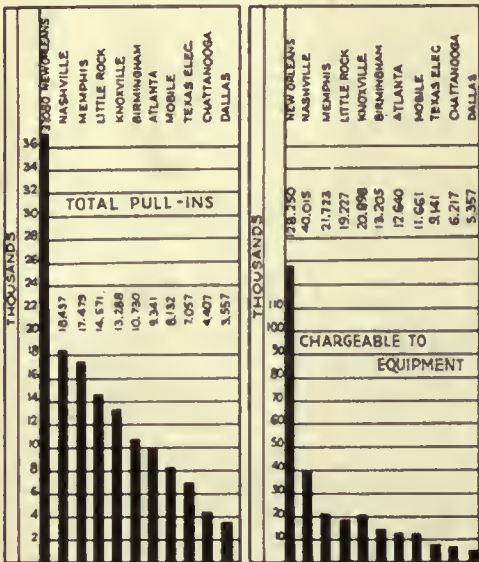
5,357 miles in Dallas to 128,250 miles in New Orleans. This is greater than for any previous year. The accompanying illustrations give comparisons of pull-ins and maintenance cost for each property represented in the association.

The statement giving the detailed troubles which have resulted in car pull-ins shows that armatures have been the chief cause of breakdowns. Other equipment parts which have caused high numbers of pull-ins are fields, brushes and holders, motor leads, gears and pinions, controllers, air brakes and brake rigging.

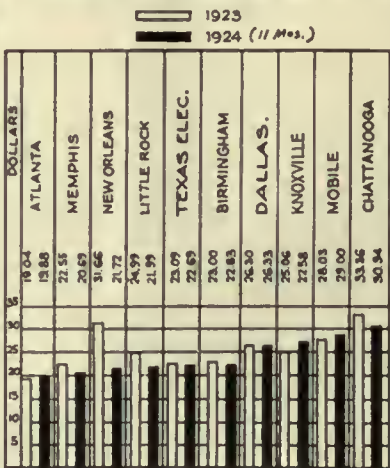
The chart giving comparisons of average miles per pull-in by years from 1921 to 1924 inclusive shows in a very striking manner how pull-ins can be re-

duced by giving particular attention to the causes. The record of each individual property has been bettered each succeeding year. New Orleans has shown the greatest improvement with an increase from 2,803 miles per pull-in for 1921 to 37,080 miles per pull-in during 1924.

The chart of comparative equipment maintenance cost on a car-mile basis shows that the low figure of 2 cents per car-mile has been obtained in Atlanta, with other properties showing very low costs also. The highest is that of Chattanooga with 3.1 cents per car-mile.

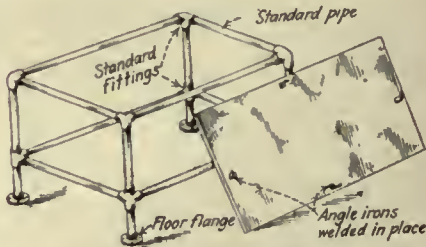


Average Miles per Pull-In and Cost of Equipment Repairs, Southern Properties. At left, average miles per total pull-in for year 1924; in center, average miles per pull-in chargeable to equipment; at right, comparative maintenance cost of equipment per 1,000 car-miles for year 1923 and 11 months of 1924.

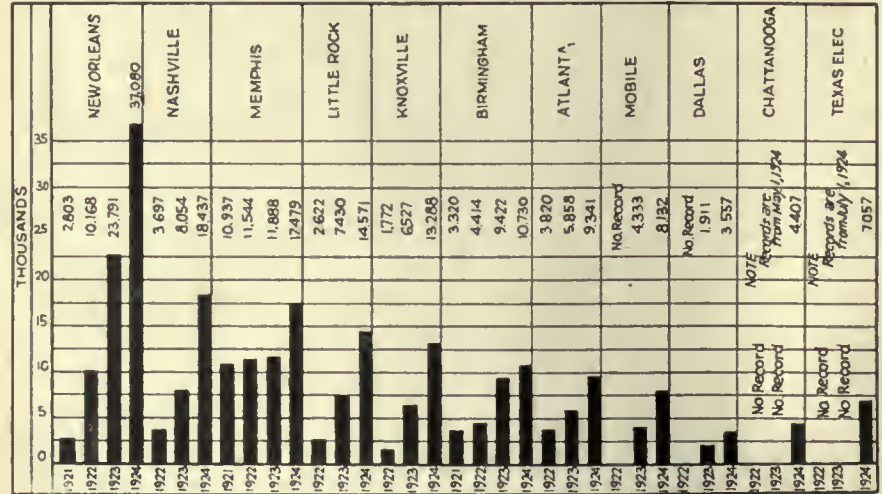


Welding Table for Light Work

MUCH of the welding carried on by electric railways in maintenance work is on small parts which may be picked up and carried about by hand. For this class of work a light welding table, which may also be moved about, is particularly convenient. Several railways have made tables by using a framework of steel



This Table, Constructed of Standard Pipe and Pipe Fittings, Facilitates Welding of Light Parts



Average Miles per Total Pull-In by Years, 1921 to 1924 Inclusive

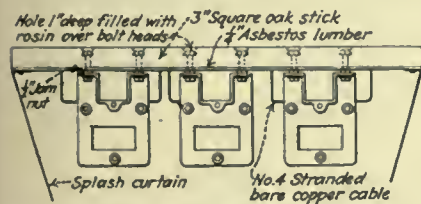
or of pipe with a solid steel or cast-iron top. The size of such a table, of course, varies with the work to be handled and the space available on different properties. A convenient size is 3x5 ft. An accompanying illustration shows such a table constructed of 1½-in. pipe with standard pipe fittings. On some railways many of the fittings are done away with by welding the pipes together where they join.

For light welding the work may be set on the bench, which is grounded, and the contact will be sufficient to carry the necessary welding current. A vise added to the table

top has been found convenient for holding the piece in proper position during the welding operations and also to form the contact for the welding current. Where it is found inadvisable to have the framework carry the current, a bar with one end connected to ground can be laid across the piece being welded. This will provide sufficient current carrying capacity, provided all scale and rust which might prevent proper contact are removed.

Installing Standard Resistors

STANDARD resistors are being installed in a uniform manner on all cars of the Syracuse division of the New York State Railways when they are taken into the Wolf Street shop for overhauling. The company's standard arrangement consists of three frames of resistors placed in a row on one side of the



Method of Mounting Resistors Adopted as Standard in Syracuse

car, depending on the equipment and style of car. The resistance frames are supported by two 3x3-in. oak blocks running lengthwise of the car. The blocks in turn are fastened by two ½x2-in. iron brackets. Asbestos lumber of ¼ in. thickness is placed over the resistors.

Standard bolts with lock washers are used for fastening the resistance frames to the blocks. The bolt heads are countersunk 1 in. and after the bolts are in place the holes are filled with rosin. Sheet steel splash guards are placed at the ends of the row of resistors to prevent water and slush from striking the grids. The resistance wires as they come from the main cable are covered with ½-in. duraduct, which runs to the asbestos lumber shield. From this shield to the terminals of the grids the wires are bare, so as to prevent any insulation from becoming charred due to overheating of the resistors. The bare wires are thoroughly tinned. An accompanying illustration shows the method of mounting and the splash shields used at either end of the resistor frames.

Bead of Solder Indicates Pole Clearance

By F. C. LYNCH

Shop Supervisor Kansas City Railways

IN THE Kansas City shop it is the practice, when soldering the band wire on the armatures, to leave several small beads of solder spaced at intervals around the armature so that when it is put into the motor housing these small beads of solder

rub down by contact with the pole pieces.

Their thickness indicates exactly the clearance that remains before the armature will touch the pole pieces. In this way an examination of these beads at any time, even when the armature is in the motor, will indicate quickly whether the bearings are in a condition that is likely to cause the armature to rub in the near future.

New Equipment Available

Improved Switchboard Instruments

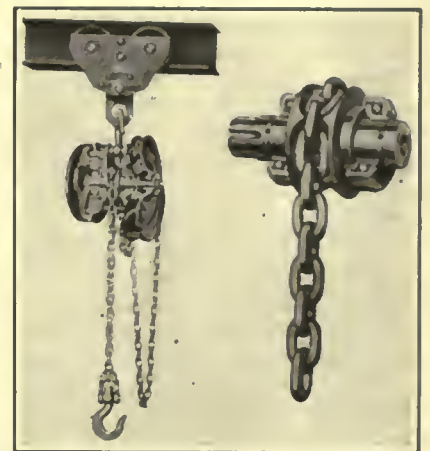
THE horizontal edgewise switchboard indicating instruments manufactured by the General Electric Company, Schenectady, N. Y., and known as its H-2 type, have been redesigned, the new line being designated as type H-5. The line includes ammeters, voltmeters, wattmeters, power-factor meters and frequency meters, for use where the measurement of electrical energy is necessary.

Among the changes are improved armature coil and pointer construction; increased insulation of current winding; non-corrosive finish on frame, magnets, screws, etc., and new strip-wound magnetic shield. The jewels and pivots in these instruments have been reversed, the jewels being mounted on the armature shaft while the pivots are mounted in the frame, thus permitting their ready removal.

Ball-Bearing Chain Block

A DEVELOPMENT in hoisting equipment, consisting of a ball-bearing spur-gear chain block, has just been placed on the market by the Yale & Towne Manufacturing Company, Stamford, Conn. Two chrome alloy ball bearings which support the load-sheave shaft are arranged to take the entire weight of the load and to withstand the shock of all thrust and overload surges. The bearings are inclosed in small chambers and provision is made by means of steel and felt washers to prevent dust and grit from entering the bearings.

Continuous lubrication of the bearings, driving pinion, shaft and driving gears is a feature. The top

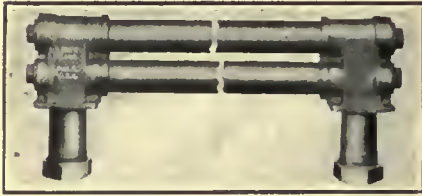


Sectional View of Chain Block, and the Arrangement of the Ball Bearings Which Support the Load Sheave

hook, crosshead, suspension plate, load sheave, load chain, detachable shackle, bottom crosshead and hook are all of steel. An increase in mechanical efficiency of more than 6 per cent has been obtained through the introduction and use of ball bearings, where they carry the full load. The new ball-bearing blocks are furnished in capacities of from 1 to 20 tons.

Unit Bus Heater

AN IMPROVED type of unit bus heater for installation under seats is being placed on the market by N. A. Petry Company, Inc., Philadelphia, Pa. The unit consists of cast ends with straight pipes connecting. It is made in two sizes of tubing, 1½ in. and 2 in., and in both vertical and horizontal types standard lengths are 5 ft. to 9 ft. The tubing is welded in the malleable-iron manifold castings, which are provided with removable plugs to facilitate cleaning of the tubes. The horizontal type is made especially for



Unit Type of Bus Heater for Installation Under the Seats

de luxe coaches having full-width cross-seats. Connections between adjacent heaters are made under the floor of the bus.

Anchorage for Track Bumpers

A BUMPING post for stub-end tracks has recently been placed on the market by the Hayes Track Appliance Company, Richmond, Ind. In appearance it resembles existing types with rigid construction but presents a distinctive form of anchorage to the track. Tension legs with U-shaped ends pass completely under the rail and up on the outside where the end is held in position by a pin passed through it. The bearing of each of these legs is carried by a shoe which is bolted to the rail and spiked to the supporting tie. A flange on the underside of each of these shoes bears against the side of the adjacent tie. Tie anchor bars connect with a lug on the upper face of each shoe and are spiked to the four ties ahead of the bumping posts to complete the system of anchoring the tension members to the ties.

The anchorage of the back legs is accomplished by using steel posts which seat against shoes bolted to the rail. These shoes are provided with flanges which fit against the face of the adjacent tie and with tie anchor bars which extend over the three ties ahead. The anchorage thus brings eight ties into play and is based on the theory that for the best results bumping posts should be connected with the ties rather than with the track rails.

The compression members fit the compression shoe and the seat in the head in such a way that while bolted at each end the bolts do not carry the compression. The tension members are rectangular bars, which are not only curved at the lower ends but also at the upper end in order completely to go through the head. A large pin below the bumping head holds the tension members in place. As an additional precaution, the two

compression joints are connected together by a tie rod at the lower end to keep them from spreading under the shock of an oncoming car.

Mechanical Helper for Blacksmith Shop

A NEW type of power hammer intended for use with standard anvils is being introduced on the market by the Blacker Engineering Company, Inc., New York, N. Y. This is essentially a mechanical helper developed so that blacksmiths can use their own hand tools and anvil now available and replace the human strikers and hand-swung sledges.

The maximum blow of the machine is about four times as heavy as a

The striking head is located at the end of two pairs of arms. These can be adjusted so that the work is always struck a flat, straight blow. The movement of the head is exactly similar to that of a hand-swung sledge. It rises to strike the blow and then rebounds quickly from the metal. The usual distance between the head and the anvil is 8½ in. The stroke can be adjusted to suit any particular work in hand.

The hammer can be driven from a line shaft or can be provided with an individual motor drive where desirable. When driven from a line shaft, tight and loose pulleys of 15-in. diameter by 2¼ in. face are recommended and the belt should have at least a 7 ft. drive. The individual motor-driven unit is most



Mechanical Helper In Use at the Morris Park Shops of the Long Island Railroad

human striker averages, and the machine attains the rate of 140 blows per minute on both light and heavy work. Lateral motion is provided so that the hammer can travel the entire face of the anvil and strike any part desired. The lateral transverse motion is controlled by a winged foot lever conveniently located to the right of the anvil. The head can thus be centered exactly over any point where it is desirable to strike a blow and can be located over the two hardie holes for swaging, punching and similar work.

compact and offers several advantages. The motor is mounted on a small stand in the base and geared through a large driving gear on the main shaft. A 1-hp. motor is employed and any standard make can be supplied.

Several electric railways are using this type of hammer with success, among which are the Cleveland Railway and the Long Island Railroad. The accompanying illustration shows the hammer in operation at the Morris Park shops of the Long Island Railroad.

The News of the Industry

Commission Controls Rates

Decision in Richmond Case Affecting Virginia Railway & Power Places Jurisdiction with State Body

The Supreme Court of Appeals of Virginia has decided that notwithstanding provisions of the Constitution of Virginia, acts of the General Assembly, ordinances of the city of Richmond, and contracts between the city and the Virginia Railway & Power Company and its predecessors, the State Corporation Commission is clothed with the final authority to establish rates for the transportation service supplied by the company. In its opinion the Supreme Court upholds the ruling of the State Corporation Commission in the appeal of the city of Richmond against the company.

It was control over rates on track-age operated under various franchises granted prior to the adoption of the Constitution of 1902, before the establishment of the State Corporation Commission, that constituted the issue in the case just decided. That issue has been decided against the contention that the right to regulate rates of public service corporations chartered prior to 1902 is reposed in the cities and towns in which such corporations are operated. The court holds, with the State Corporation Commission, that the state's reserved police power, to be exercised in behalf of the public weal and for the general well-being of the state, is paramount—in the absence of specific constitutional provisions limiting this police power—even over contracts which were valid when made and which are inviolable as between the parties to such contracts. It further holds that the constitutional provisions cited by the city and referred to in the opinion do not suffice to limit the state's police power to the extent of depriving the state of the right, through the agency established by the instrumentality of the Corporation Commission, to fix such rates.

As the Richmond *Times-Dispatch* says, the court, in the case of the Town of Victoria vs. Victoria Ice, etc., had already held that the Corporation Commission had jurisdiction over rates in franchises granted after 1902, when the present Constitution became effective. In fact, the court discussed the Victoria case. In so doing it quoted the conclusions announced in that opinion, part of which reads:

That the state having reserved the right to prescribe rates, the General Assembly has designated the tribunal and prescribed the procedure for the investigation of such rates thus specified by municipal ordinance adopted since the present Constitution became effective; that the State Corporation Commission is thereby expressly vested with jurisdiction, after hearing and investigation, to prescribe different rates adjudged to be reasonable,

anything in such ordinance to the contrary notwithstanding; excepting therefrom, however, such contracts, if any there be, as may have been authorized by the state before the present Constitution became effective.

Almost at the end of its opinion in the present case, the court says:

Whether the conclusion herein reached follows as a result of "evolution" or "revolution," we feel that, in the promotion of the common weal, it is the best solution of a most difficult situation. Any other settlement of the matter would depend upon legislative action, and we do not think that the issues involved should be cast as drift-wood into the uncertain current of politics.

In commenting on the decision the *Times-Dispatch* said:

It is assumed there is little likelihood of an appeal to the Supreme Court of the United States, for the reason that the decision does not precisely involve impairment of a contract; it holds that the contracts in question are valid enough until the state exercises its inherent and retained right to regulate certain matters connected with and growing out of those contracts. Unpleasant as it may be for municipalities to contemplate, it is hardly open to question that the State Corporation Commission is better qualified to evaluate properties and fix rates than the average council of the average city or town.

Bus Fare Cut Suggested at Detroit

Mayor Opposes Fare Discrimination—Street Railway Commission Claims Bus Rate Corresponding to Railway Fare Would Mean Loss

IN response to a recommendation from Mayor John W. Smith that the fare on buses operated by the Detroit Department of Street Railways be reduced to 6 cents to correspond with the fare on the municipal railway, the statement is made by the Street Railway Commission that such action would cause a deficit of \$250,000 a year. Mayor Smith's recommendation was studied thoroughly in connection with the showing the buses have made in the few weeks they have been operated.

A 10-cent fare is now charged on all buses. This entitles the passenger to a transfer to the nearest railway line. By paying an additional cent the rider can transfer to the second car line. The payment of an 11-cent fare thus enables the rider to go down town from outlying districts which previously had no reliable transportation service.

MAYOR'S CASE STATED

In making his recommendation, the Mayor pointed out that the city would demand not more than a 6-cent fare if the service into the outlying districts were afforded by means of trolley cars. While it was realized that much of the bus service must be given under conditions that would mean a loss at a 6-cent fare, the Mayor holds to the belief that D.S.R. operation must stand as a single endeavor and that there can be no discrimination in fare between residents of one part of the city and residents of another.

In reply Ross Schram, general manager of the D.S.R., says the commission would not have built railway lines on some of the routes at present because of the prohibitive costs.

The commission's study indicated that the present fare of 10 cents charged on the buses will result in a deficit of approximately \$100,000 a year. At the present time the same taxes for buses are required from the street railway department as from the Detroit Motorbus Company. This yearly tax paid by the D.S.R. and the private company is reported as approximately \$400 per bus. A reduction in the city's rate of

bus fare should be accompanied by a lowering of taxes, and the lowering of the fare, the commission believes, would also curtail the extension of bus service.

In summing up, the commission agrees that the coach fare should be reduced if the policy is to be followed that was established before the advent of the automobile and before the extraordinary annexations to the city.

The communication to the Mayor, signed by G. Ogden Ellis, president of the commission, said in part that:

For the purpose of serving the greatest possible number of people, this department installed the first of its coach lines on New Year's Day, and since that time has laid 30 miles of coach routes, running through the outlying sections. Within the next two or three weeks all of this 30 miles of routing will be in operation. There is more than 23 miles in operation at present. These routes are operated by 50 light-type coaches and in one year they will run 2,187,000 coach miles.

At the present rate of fare this operation is failing to meet expenses by 7 cents per mile. As the riding developed, this deficit may be absorbed to some extent, but we are confident that even the present rate of fare will not prevent a deficit of more than \$100,000 for the first year. Furthermore, we will be required to expend at least \$50,000 for service arrangements within the next few months. If we make the coach fare the same as the street car fare our books indicate that we will have an operating deficit for coach service of at least \$250,000 for the first year.

The traffic upon the majority of these routes which have been installed indicates that in not more than one or two cases would we, from the standpoint of good railway practice, be justified in extending our tracks. We point out these cases to show that we have gone ahead to install this coach service in a great many places where we would not have considered installing car service, feeling quite certain that we would be permitted to charge an extra fare. If we are to reduce the coach fare, the extent of our coach system must be greatly curtailed from that which we have in mind.

To indicate the scope of our plans, we will, in 30 days more, operate one-third as much mileage as the Detroit Motorbus Company. With this coach installation of 30 miles we outrank every street railway in the manner of pioneering in outlying districts, and this regardless of the rate of fare paid on our trolley cars.

Another point for your consideration lies in the fact that we are paying the same pavement tax for our vehicles as is paid by the Detroit Motorbus Company with heavier equipment. If our fare is to be reduced, should there not be an adjustment of our paving charge?

Atlanta Regulates Jitney

Motor Vehicles Ruled Off Railway Streets and Out of the "Congested Area"

The City Council of Atlanta on Feb. 2 eliminated jitneys from the streets of the city by a vote of 22 to 8 when an ordinance introduced by the special traction committee was adopted.

The ordinance really supplants a measure adopted originally in April, 1919. It has been the subject of a bitter fight ever since it was drawn up by the special committee. Stated briefly, the new law provides that all jitneys be prohibited from operating on any streets where car lines are in operation, on streets within two blocks of and parallel to streets occupied by car lines, and on streets in the downtown district of the city in what is known as the "congested area."

The ordinance, however, contains provisions by which buses with a seating capacity of 17 persons or over may operate in sections not served by the railway, thus permitting the bus lines now operating between Morningside and Sylvan Hills to maintain schedules.

Under an amendment to the original ordinance, operators of buses will be forced to carry \$10,000 of indemnity insurance against single accidents, with a maximum of \$50,000, instead of posting a \$5,000 indemnity bond for each person who might ride in the bus, as provided in the original measure.

The ordinance provides a fine of \$200 or 30 days at work on the public works of the city, or both, for each violation of the ordinance. Every day on which the bus is operated in violation of the ordinance is to be considered a separate offense.

The final clause of the ordinance gives the City Council the power to license buses to operate at any place or at any time, as well as to deny bus owners the right to operate on the public streets of the city. Under this last provision there will repose with the Council the right to permit the operation of buses at any time in competition with the street cars if it felt that the service being rendered by the railway is inadequate.

The ordinance becomes effective 30 days after it has been signed by the Mayor. The regulations now about to be put into effect have long been desired by the Georgia Railway & Power Company and are along lines suggested by John A. Beeler in his expert report to the city.

Two-Track Subway Suggested for Pittsburgh

Daniel L. Turner has formulated his plan for transit relief for Pittsburgh. A two-track subway extending from Chatham Street along the line of Fifth Avenue and Sixth Street to Duquesne Way is the substance of the report of the traffic commission. It was presented to the Council on Jan. 29.

No promise of immediate relief from downtown congestion is held in the conclusions reached by the traffic commission, as the solution presented contemplates a future rapid transit system of which the Fifth Avenue Federal Street is the initial section and can be built for \$6,000,000 or the amount

voted in the 1919 bond issue for a subway in the First and Second Wards.

Before a start can be made on this, the report states a year would be spent in making an intricate survey of underground conditions, including the underground systems of the public utilities, foundations and strata formations.

Briefly, the plan provides an east and west rapid transit between the East End and Northside, the general lines of Ellsworth and Frankstown Avenue to the East and Federal Street to North Avenue. A future consideration of the plan is for another subway from North to South following the general line of Grant Street.

The Rat's Revenge*

WITH a rat pursuit is not delusion but a hideous reality. The hand of every man is against him. Waking or asleep, his life hangs by a thread. What is more natural, therefore, than that he seize any opportunity that offers to wreak his spite upon his enemies? Who can blame the rodent which gnawed through the insulation of a 30,000-kilowatt generator in the main Interborough power house at Fifty-ninth Street and the Hudson River, thereby causing a short circuit which resulted in the second most complete subway tie-up in the history of the city?

To a rat the men who seek to trap or destroy him because he wastes their substance are as sinister as any interests that ever set out on the trail of a public official. Lacking the gift of oratory with which to denounce these pursuers, without a stenographer to whom he could dictate denunciations of them, what was more reasonable than that he should avail himself of the only means at hand to "get back at them"?

To be sure, a subway tie-up of twenty minutes is not comparable to a subway tie-up of seven years. But a rat without official position, without a political organization or a Hearst newspaper behind him, without even a radio station through which to launch accusations against potential destroyers, can hardly expect to interrupt a city's transit system indefinitely. He can only do his poor best.

Had this spirited little creature been clothed with power, filled with the belief that he was being hounded not for his shortcomings but for his virtues, and inspired with an ambition to overthrow all who disliked him, he might have wrecked the whole plant and kept the people out of subways till an entire new equipment could be installed. He was, however, but a rat. And while he could not approach the record for subway hold-ups that will stand for all time, his was an achievement of which he has no cause to be ashamed.—Editorial from New York Tribune.

*Appropos of a tie-up on the lines of the Interborough Rapid Transit Company on the morning of Feb. 2.

"Friday the Thirteenth"

Eventful Day for Chicago in Purchase Negotiations Announced by Mayor Dever

"The money lenders are satisfied; for the city I can say we have driven a good bargain." With these words Mayor Dever of Chicago buried his threat to repudiate the recent appraisal of the Chicago Surface Lines and ended nearly a year of jockeying over the price to be paid by the city in the event of municipal purchase. The figure referred to is the 1907 compromise basis price of approximately \$163,000,000.

The Mayor set Feb. 13 for the completed traction bill to go to Council for adoption. This will be too late for referendum at the Feb. 24 election. The purchase of the properties and the approval of the \$500,000,000 traction plan will then have to wait for the judicial and aldermanic election of April.

No effort is made to conceal the chance of defeat at the polls, and this, the Mayor says by inference, is because of the good management under which the lines are being conducted. He said:

And yet the people are skeptical. For many years the lines were terribly managed. The people are afraid to change—afraid of politics. But we have guarded them against that.

This ignores and at the same time answers William Hale Thompson, a bedfellow in demagoguery of Mayor Hylan of New York, who has a slate of aldermanic candidates out shouting of "Wall Street," "La Salle Street," the "interests," and what not in no way connected with taking a street car to work in the morning.

Mayor Dever said to bankers, that failure of the city plan would knock the bottom out of traction company finances and that there would not be a dollar toward paying the principal of \$110,000,000 due in 1927.

George E. Brennan said he would put the Democratic party organization behind the purchase plan and drive it through.

Mr. Maltbie on Milwaukee's Proposed Franchise

W. H. Maltbie, consultant on public utility valuations, rates and taxation, Baltimore, has an extended article in the January issue of the *National Municipal Review* on the proposed service-at-cost franchise in Milwaukee. This franchise is to be submitted to the voters before adoption, and its principal terms were published in the *ELECTRIC RAILWAY JOURNAL* for Oct. 4, 1924, page 571.

In Mr. Maltbie's opinion, the chief interest in the Milwaukee franchise, which provides service at cost, is in the mutual concessions which have been made by the municipality and utility, in order to reach a working basis and in the safeguards that have been devised for the protection of the interests of both parties. On the other hand, Mr. Maltbie points out that the contract seems to provide no reward for efficiency. It does, however, work to the benefit of the city in that it reserves to the city the right of inspection of practices and to insist (subject to arbitration in event of dispute) on the adoption of new methods.

Indeterminate Franchise Sought in Oakland

The Key System Transit Company, Oakland, Cal., has started a campaign to secure an indeterminate franchise to replace the present short-term franchises, some of which will expire in 1933 and the remainder by 1936.

This question will probably be put up to the voters at the election in April and it is likely that until the matter is definitely settled none of the extensions recommended in the joint traffic survey, which has been in progress since last summer, will be built.

President C. O. G. Miller of the Key System says it is impossible to finance improvements in which a large amount of money is involved under short-term franchises. He says:

The company is willing to make these extensions recommended by engineers appointed by the California Railroad Commission, the city of Oakland and the Key System provided the necessary funds can be obtained and provided a reasonable expectation can be indulged that the people from whom these moneys are obtained will be assured of an adequate return on the investment and the company assured of a continued right to operate the property under proper conditions for a proper length of time.

We are ready, therefore, to co-operate with the public authorities of the East Bay cities and especially with those of the city of Oakland in the preparation of such franchise provisions as will receive the approval of the electors and adequately protect the public interest, while enabling us to meet the public demand for increased service.

No railway extensions have been made since the present Oakland charter was amended in 1917.

An amendment to the charter such as has been proposed has an excellent chance of passage at the polls, as most of the voters, realizing that the bay cities are growing rapidly, are willing to do almost anything in order to secure better transit.

The franchises of the Southern Pacific electric lines in Oakland expire on March 6, 1930. So far this company has made no announcement of future intentions, but it is likely that the company will stand with the Key System in seeking charter amendments.

The Southern Pacific electric service in the bay cities is practically all interurban; that is, between the various bay cities and their suburbs and San Francisco. That company has no feeder lines and recently abolished its Alameda service. Some extensions of this service have been talked of at various times, but it is certain that they will never be effected under the terms of the present Oakland charter.

Massachusetts Arbiters Refuse Wage Increase

The arbitration board has declined to increase the pay of employees of the Middlesex & Boston Street Railway, Newtonville, Mass., from the present rate of 55 cents an hour to a new level of 70 cents an hour. Judge Malcolm E. Sturtevant of the Somerville police court, chairman of the board, says that the trend of the cost of living is downward, and that the road cannot pay higher wages at present. The arbitration award will be binding until Dec. 31, 1925. The board favors an 8-hour day, but instead of fixing this limit leaves it to the company and union to

settle. Miscellaneous employees are awarded overtime at the rate of 50 per cent extra for each half hour or fraction thereof. Pitt F. Drew, president of the railway, served with Chairman Sturtevant as one of the arbitrators. James H. Vahey was the carmen's representative on the board. He dissented from the decision.

Reorganization and Rehabilitation in Cincinnati Promised

If the proposed new 25-year traction ordinance is accepted by the city of Cincinnati, Ohio, the Cincinnati Street Railway will be reorganized and will launch a program that will include bus "feeder" lines and the operation by the company of the rapid transit system. Samuel Assur, vice-president of the Cincinnati Street Railway, has so advised the city administration. He pointed out that the reorganized company could finance such a program of improvement by issuing "modern first mortgage bonds from time to time when interest costs on the market are low." These bonds at reasonable rates of interest would provide funds for years to come.

With regard to rapid transit, Mr. Assur said that the passage of the new ordinance would mean that engineers would be employed at once by the company to make a traffic survey and an estimate of the cost of equipping and operating the "loop" upon its completion to Oakley. This would mean that the \$6,000,000 "sunk in the loop by the city" would not become a total loss. Mr. Assur said that the loop could be made to co-operate with the present system so as to give rapid transit to many communities and that when the success of the loop had been established rapid transit should be provided for the western and extreme eastern suburban sections. Mr. Assur declared that the company would be able to operate under a 7½-cent fare, despite the predictions of the members of the citizens' traction committee to the contrary.

Bill Aims at Missouri Bus Jurisdiction

A bill was introduced in the Missouri Legislature on Jan. 21 to place motor transportation under the jurisdiction of the Missouri Public Service Commission. It provides a fee in addition to the regular motor licenses for the operation of the automobiles used in public service. The bill is broad in its terms and includes the St. Louis buses and service cars.

The Missouri Public Service Commission would, under the terms of the bill, govern the rates, operation and equipment of motor carriers and fix the tax which they would have to pay cities and counties in which they operate. Bus companies would not be permitted to operate without a certificate of convenience and necessity issued by the state board. Senator McCawley said the purpose of the bill was to protect the public and encourage responsible bus companies. The bus lines would be subject to periodical inspection, their load weights regulated and they would be required to report regularly to the Public Service Commission.

West Side Project Advanced in New York City

The New York Central Railroad is ready to build without cost to New York City a \$24,000,000 combined automobile express highway and elevated freight railroad along the west side of Manhattan from Seventy-second to Canal Street. In consideration of the improvement the New York Central would accept a readjustment of its rights and easements along its lines and in its yards.

Borough President Miller has been negotiating for 6 months with the New York Central. He took up with railroad executives the question of eliminating surface railroad operation by steam on Eleventh Avenue at about the time that he concluded negotiations for the opening of Depew Place—the bottle neck of Park Avenue at the Grand Central Terminal.

The city's chief gain from the elevated express highway and freight railroad, according to President Miller, would be the removal of the dangerous railroad tracks from the surface of Eleventh Avenue and the reclamation of 84 blocks of street surface for traffic. The removal of the tracks would eliminate 100 grade crossings and would provide an entirely new avenue connecting with the vehicular tunnels at Canal Street. The express motor highway would be on the roof of the elevated freight railroad.

Of the total cost of the project \$13,000,000 is the amount for the freight railroad and \$11,000,000 for the motor highway.

In commenting on the proposed undertaking President Miller, among other things, said:

For 77 years the Hudson River Railroad has operated a steam surface railroad on west side streets. The dangerous condition ensuing and the deaths resulting from this operation were apparent from the start. For years State Legislatures, city officials, commissions, associations and many others have endeavored to abolish the tracks on "Death Avenue." In addition, the presence of the tracks and their noisy, unsightly operation casts a blight upon the west side of the city, and has greatly retarded the development of one of the most accessible districts in Manhattan, adjoining its most valuable waterfront.

Under the plan now proposed the tracks will be taken off these streets; the entire district, which has long been stagnant, will develop commercially on account of the new facilities planned and the value of this great area of real estate will be enhanced.

In the official announcement no mention is made of the intended electrification of the lines, but the very nature of the improvement implies that this change will follow.

Bus Company Organized in Anderson, Ind.

Walter Shroyer, secretary-treasurer, Harry A. Nichol, general manager, and Arthur W. Brady, president of the Union Traction Company are the incorporators of the Traction Motor Transit Company, Anderson, Ind. While it is said that the purpose of the Traction Motor Transit Company is to operate a bus now in use between Fort Harrison and the Union Traction station, it was indicated by Mr. Brady that the company also will operate trucks. That the company would do so has been stated unofficially before.

Economic Marketing in Industry

Secretary Hoover Stresses the Place of the Technical Paper in the Business World

Economic marketing in industry, with particular stress laid on the help industrial and business papers may give in cutting the corners of waste in sales and distribution, was the general topic of discussion in a three-day convention of the business and editorial representatives of the fifteen publications of the McGraw-Hill Company, publisher of the *ELECTRIC RAILWAY JOURNAL*, which closed Friday night, Jan. 30, with a dinner in the Hotel Pennsylvania, New York. Reading of a letter from Herbert Hoover, Secretary of Commerce, in which that Cabinet official stressed the importance of the industrial and business publications as leaders in economic and industrial thought, was one feature of the banquet. Julius H. Barnes, formerly president of the Chamber of Commerce of the United States; Fred I. Kent, vice-president of the Bankers Trust Company, New York; David Sarnoff, vice-president and general manager of the Radio Corporation of America, and Fred M. Feiker, vice-president of the Society for Electrical Development, were the guest speakers.

Outstanding American industrialists took part in the sessions of the convention itself. Their talks followed closely the lines laid down for discussion and each speaker stressed important phases of the effort of the McGraw-Hill Company to develop to the maximum its program of service to industry in promoting economic and efficient selling and distribution methods. Facts brought out in the company's nationwide survey of the buying habits of industry were emphasized repeatedly in the convention and round-table group discussions.

The convention opened Wednesday morning, Jan. 28, with a discussion of the new era of sales development by James H. McGraw, president of the McGraw-Hill Company. There were talks by important industrialists, these including W. L. Batt, president of the S.K.F. Industries, Inc., and P. L. Thompson, advertising director of the Western Electric Company and a past-president of the Association of National Advertisers.

Secretary Hoover's letter, read at the dinner by Mr. Feiker, struck the keynote of the convention. He said:

I wanted to attend your convention to say a personal word of appreciation for the fine service which you, your company and your publications are rendering to American industry. It is a real disappointment to me that I cannot come.

A big change has come in the spirit of American business, and for this change you are in part responsible. I mean the change from rule-of-thumb and *laissez faire* to scientific determination of facts and programs of action based on facts. The business press is probably the greatest force in making industrial opinion. The schools and colleges have an important place, the trade associations can do much in the fields of production and distribution, the government bureaus that keep in contact with business can help to promote sound leadership in industrial and economic thinking. All have an important place, but the business press and technical journals are in a unique position and have a unique opportunity. I believe that no organization of technical

publications has come nearer to living up to this opportunity than the McGraw-Hill publications under the leadership of James H. McGraw.

The thought that I have in mind is that your great group of journals cannot only recognize and support sound industrial leadership, you can also initiate it. The field of your opportunity is practically limitless.

The objectives of the sales convention were outlined at the dinner by Malcolm Muir, vice-president of the McGraw-Hill Company, who also reviewed briefly the accomplishments of the three days of discussion. Edward J. Mehren, vice-president of the company and chairman of its editorial board, was toastmaster and spoke briefly at the close of the dinner, stressing the opportunities of the industrial press, as brought out in the convention, to serve the whole field of industry.

Service Must Be Cut or Fares Raised in Buffalo

Immediate reduction in service on the local lines of the International Railway, Buffalo, will be necessary unless a higher rate of fare is authorized at once by the Public Service Commission. Herbert G. Tulley, president of the corporation so stated in a formal notice served on the Public Utility Commission.

Mr. Tulley says that for the three years past the International Railway has been supplying a service which cost much more than the fares collected. In 1924 the cost of this service exceeded the receipts by \$660,000. He says service has been made possible through liberal contributions from the owners, a condition which can no longer be continued. The company cannot this year commit itself to the expenditure of the \$500,000 desired by the city of Buffalo in its track and repaving program until an increased fare has been authorized.

In a letter addressed by President Tulley to Mayor Frank X. Schwab, he says in part:

It was from the first recognized by the railway that bus service on Delaware Avenue and Delavan Avenue would have to be run without a profit. The results show this to be the case. In our desire to do everything possible to secure your co-operation, we have been willing to add this deficit to the sum of our earlier losses, which have been occasioned largely through the Mayor's continued connivance with the enemies of the company in diverting every possible passenger to the irresponsible jitneys and in fighting against our every planned economy.

The International has been operating a bus line in Bailey Avenue at a 7 cent fare with a loss of more than \$2,000 a month. The company can, however, go no farther in this direction and has requested the Public Service Commission to at once permit collection of a 10-cent fare without which service must be soon discontinued.

The city is desirous that the company shall this year spend about \$500,000 for track replacement and paving. This, we shall be unable to undertake, unless and until increased revenue be received. Meanwhile the only expenses which we can undertake will be those necessary to the better protection of our passengers or in line with more economical operation.

President Tulley says that the operating deficit for 1924 has been increased to \$1,660,000. He says a street railway must expect to give some non-paying service, but that when the operation as a whole results in a continuing deficit there is nothing to do but stop running the losing lines and continue the profitable ones.

Opposed to Fare Charge

Complaint has been made to the New York Public Service Commission by the municipal authorities of Buffalo against the practice of the International Bus Corporation, a subsidiary of the International Railway Company, Buffalo, of charging 17 cents for a one-way fare from the Kensington district to Black Rock and vice versa when passengers use the Delavan Avenue bus line across town. The bus company will not issue a transfer to a passenger after a transfer has been tendered for a fare. When passengers are required to use a street car to reach the bus, a second transfer from the bus to another car line is denied.

Mayor Frank X. Schwab, at the request of associations of business men and taxpayers in Buffalo, asked Herbert G. Tulley, president of the bus and traction companies, to make this adjustment, but the company says it is a problem for the Public Service Commission. The city authorities also have asked the commission to order the bus company to allow children in arms to ride free when not occupying a seat. The company now makes a charge of 10 cents for children in arms whether occupying seats or not.

Virginia Commission Denies Petition

The Virginia Corporation Commission recently denied the petition of the Alexandria Suburban Motor Vehicle Company, a subsidiary of the Washington-Virginia Railway, to operate bus lines as feeders. At the same time the commission allowed the petition of Robert L. May for a certificate to operate a bus system between Washington and Alexandria.

The railway proposed 24 round trips a day on its feeder lines, while it was brought out that the May system of buses was operating 64 round trips a day and giving adequate service. It was further testified that if the electric railway ceased operation the bus system could handle the traffic. For the past seven months Mr. May has been operating buses under the name of the Alexandria, Barcroft & Washington Bus Lines.

A meeting of the bondholders' committee of the Washington-Virginia Railway will decide this week the fate of the company. Whether the road will be reorganized or definitely pass out, as a means of transportation in and near the Capital City, will be settled. Arthur L. Reynolds, receiver for the company, said that there were two courses open. One is that the bondholders will effect the reorganization of the road on the basis of its present physical valuation, and the other is for complete junking of the line and its abandonment as a carrier between Washington and near-by Virginia. He places a physical valuation of the road as a growing organization at about \$4,500,000. He said if the road were junked about \$700,000 could be obtained by sale of equipment. A bondholders' committee has been formed and Day & Zimmermann have been retained to investigate the engineering phases of the road's operation.

News Notes

Fares Advanced.—Electric railway fares in Athens will be advanced to 10 cents for one cash fare, with two tickets for 15 cents in the near future. An announcement to this effect was made recently following approval of a petition from the Athens Railway & Electric Company to the Georgia Public Service Commission. As an offset to the advance in cash fares, the Athens Railway & Electric Company will offer a weekly pass book, good for all members of the family, for \$1.

Inspection Trip Over New Extension.—The first train over the Niles Center extension of the Chicago, North Shore & Milwaukee Railroad and the Chicago Rapid Transit lines carried a party of about 50 officials of the companies and of the towns served on Feb. 1. Operation over the new road will be started within a short time. The trip was in the form of an official inspection tour and took place just 10 months after work was begun on the branch, which is 5 miles in length. The extension has eight stations, underground, elevated and surface tracks, new catenary trolley wire suspension and many other modern types of construction.

"What Would You Do" Again Asked.—E. M. Walker, president of the Schenectady Railway, Schenectady, N. Y., had reproduced in the Schenectady *Union-Star* of Jan. 28 an editorial entitled "What Would You Do?" This editorial appeared in a recent issue of the *Philadelphia Public Ledger* following the recovery of the company from the difficulties accompanying a heavy snowstorm. The editorial was the subject of comment in the *ELECTRIC RAILWAY JOURNAL*.

Car Riders Entertained by Transit Guest.—The "Transit Guest" will appear each month in the car racks of the Pittsburgh Railways, Pittsburgh, Pa. The paper will keep the residents of the city informed of the aims and performances of their railway property. The premier number, under date of Jan. 1, gives a few important points on the boarding of cars and also the accomplishments of the company during the past 11 months. The columns of the "Transit Guest" will be open to the public to address the editor on any subject relating to public utilities.

Fare Lowered.—The Connecticut Company, operating buses between Hartford and New Britain, after a conference with the Public Utilities Commission, has reduced the fare between these two points from 33½ cents to 25 cents, which is a three-token ride. The commission ordered the Connecticut Company to extend the first fare zone out of New Britain to Isbell's Corner, an addition of about 1 mile, effective Feb. 1.

Buses as Auxiliaries.—Bus service to the Mordecai development and to Roanoke Park was put into effect recently by the Carolina Power & Light Company, Raleigh, N. C., according to an announcement by Paul Tillery, general manager of the company. Two

White buses are operating and a third is on the way. Buses and railway fares are the same, but there is a 2-cent transfer charge between buses and street cars. The cash fare is 8 cents or two tickets for 15 cents. School tickets are good on the buses, but the regular transfer charge applies. The application to operate buses was made to the City Commissioners and was immediately granted. Mayor E. E. Gulbreth made it plain that the company was granted a license and not a franchise. Under this arrangement either the city or the power company may discontinue the buses when either party sees fit. The plan is to extend the service to other sections of the city if it proves successful.

Higher Fare Extended.*—At an executive meeting of the Public Service Commission, held on Jan. 28, the 7-cent fare for the Binghamton Railway, Binghamton, N. Y., was approved, effective Feb. 1, 1925. The old fare was 6 cents, and since 1920 has been continued from year to year by the city and the commission. The city's consent to the proposed renewal was given some time ago.

Terms of Wage Advance Accepted.—Herbert G. Tulley, president of the International Railway, Buffalo, N. Y., has announced that exactly 99.6 per cent of the employees of the company have agreed to the terms of a wage increase, made on condition that the money be converted to the purchase of the company's bonds and stock in furtherance of its policy of employee ownership. This is the second increase of its kind. The wage increase for 1925 is 3 cents an hour payable after the company earns and pays the 5 per cent interest on its bonds. The basic wage will continue at 55 cents an hour. It is said that the co-operative wage fund has been used to purchase \$220,000 of bonds at 50 and 9,000 shares of stock at an average of \$10 a share.

Higher Fare Allowed.—On the showing of the company that it could not operate profitably on a 7-cent fare and consent having been given by the city of Newburgh to an increase to 10 cents the Public Service Commission on Jan. 29 authorized the Newburgh Public Service Corporation to put into effect a fare of 10 cents on its bus lines. Eleven tickets will be sold for \$1 and school tickets for children only at the rate of 14 for \$1. The new rate is effective Feb. 1 and will continue for one year. The application of the company was referred to previously.

Interurban Fares Reduced.—An announcement has been made by the Pacific Northwest Traction Company of a reduction of interurban fares to all points south of Everett, Wash., as far as Beverly to a flat 10 cents, with slight reductions in cash fares from Everett to Alderwood Manor. One-way cash fare to Beverly has heretofore been 12 cents. Action of the company is based upon acquisition of the tracks of the local street railway from the interurban station to the city limits. Transfers to local lines by cash fares will be abolished, but transfers will be continued for those using 30 ride books. The price of 30-ride books, now in effect between Everett and Seattle, will be reduced 80 cents a book.

Buses Put in Operation.—Buses were put into operation on Feb. 1. on Broadway, Cambridge, Mass., between Kendall Square and Harvard Square by the Boston Elevated Railway. Fares will remain 10 cents for through trips and 5 tickets will be sold for 30 cents for local use.

Interurban Service Supplied by Buses.—Interurban service on the Aurora-Yorkville line of the Aurora, Elgin & Fox River Electric Company, Aurora, Ill., has been supplanted by buses. J. F. Egolf, general manager, announced that the interurban line south of Montgomery would be dismantled. The new buses are Whites with special Shaffer bodies. Each has a seating capacity of 25. The new schedule provides for bus service on both sides of the river.

Petitions for Rehearing.—The City Council of Buffalo has petitioned the New York State Public Service Commission for a rehearing on the application of the municipal authorities for an order prohibiting the operation of one-man cars on local lines of the International Railway. The city contends figures presented by the traction company witnesses showing the percentage of accidents to car-miles on one- and two-man cars were not accurate and tended to mislead the commission. The company's figures showed a fraction of 1 per cent more accidents with one-man cars than with the full crew cars.

Traction Company Accepts Council's Proposals.—The Rockford City Traction, Rockford, Ill., has presented a franchise to the City Council adapted in its principal provisions to many City Council suggestions. This action threatens to involve the Council in a lengthy battle because of the franchise submitted earlier by T. M. Ellis, Jr., representing the newly formed Rockford Public Service Corporation. The traction company's franchise accepts Mayor Hallstrom's recommendation of a wage board of local citizens, investment of State Commerce Commission with right to fix liability for share of costs in remodeling or building bridges and accession of a tract of land at First Avenue and Kishwaukee Street to the city. Some revisions in routes are included. The traction company first objected to a referendum as unnecessary, but in its draft accepts such action.

Fare Increase Under Consideration.—The State Railroad Commission will decide soon whether or not the Beloit Traction Company, Beloit, Wis., is entitled to the 2-cent fare increase it is seeking. Traction officials pointed out that Beloit is the only city in the state with a 5-cent fare and a 4-cent book rate.

Complaint Against Increase Dismissed.—The complaint of the Mayor and City Council against the increase in street car fares in Johnstown, Pa., charged by the Johnstown Traction Company has been dismissed by the Public Service Commission. The new tariff, which has been effective since early last fall, raised the price of a single trip from 7 to 10 cents, but tokens are sold at the rate of four for 30 cents, making the new rate for regular passengers 7½ cents. The rates on the Windber cars and on the bus lines remain at 10 cents.

Financial and Corporate

Interurban Reorganization Planned

Indiana Road to Pass to Insull Control
—Rehabilitation and Change from
A.C. to D.C. Contemplated

A proposed plan for the reorganization of the Chicago, Lake Shore & South Bend Railway, South Bend, Ind., improvement of that property and the turning of its management over to Samuel Insull and associates is being submitted to the bondholders by a "first lien holders" committee in Cleveland. After the plan is approved by the bondholders, the legal proceedings carried to a successful conclusion and the program finally approved by the Public Service Commission, the new company will work out a program which will include changing the present alternating-current electrification of the railroad to direct current.

The South Bend line, a 125-mile electric railroad, runs between Chicago and South Bend, Ind., by way of Hammond, East Chicago, Gary and Michigan City. The Chicago terminus of the line is at Kensington, but trains are run downtown over the Illinois Central suburban service tracks. No change in the present plan of operation is contemplated.

The railroad has been operated at a loss for several years. According to the bondholders' committee, new financing is necessary in order to improve the property and put it in a position to give better service.

ENTIRE PLAN STILL TENTATIVE

Mr. Insull and associates already are interested in the operation of other public utility properties in the territory served by the railroad. The Northern Indiana Gas & Electric Company, of which Mr. Insull is president, serves several of the cities through which the railroad passes, and the Calumet Gas & Electric Company, of which Mr. Insull is also president, serves the adjacent territory. Naturally he is interested in the growth and development of the territory because of the operation of these properties, and has agreed to take over the management of the railroad provided the plan of the bondholders' committee is carried to a successful conclusion.

The entire plan, however, is at present in a tentative state. To be effective it must first be accepted by the bondholders, foreclosure proceedings must be prosecuted through the courts, and, finally, the whole plan must be approved by the Public Service Commission of Indiana. If the bondholders' committee is successful in carrying out the various details of the plan, the management of the property will then be assumed by Mr. Insull and associates. No detailed plans for the rehabilitation of the property have been worked out as yet, as control of the property cannot finally pass to Mr. Insull and associates until all details of the reorgani-

zation plan have been accepted by all parties concerned.

The bondholders' committee is composed of Harris Creech, president of the Cleveland Trust Company; John Sherwin, chairman of the board of the Union Trust Company; Warren S. Hayden, of Hayden, Miller & Company; J. R. Nutt, president of the Union Trust Company, and H. P. McIntosh, chairman of the board of the Guardian Trust Company, all of Cleveland. It is understood that the Cleveland Trust Company as trustee for the bondholders will shortly file a foreclosure suit.

The company has \$4,776,000 of bonds outstanding, nearly all controlled by Cleveland men.

After a hearing in the foreclosure proceedings, the plan contemplates that the property will be sold under a foreclosure order to the new company which will be organized under the laws of the State of Indiana, and that application will be made to the Public Service Commission of Indiana for authority to issue the following securities:

First or first and refunding mortgage bonds.

Cumulative preferred stock.

Second mortgage, 6 per cent bonds aggregating \$250,000.

Adjustment mortgage bonds aggregating \$1,750,000 maturing in fifty years.

100,000 shares of common stock of no par value.

The first or first and refunding mortgage bonds will be sold to provide funds for re-electrification and other improvements necessary to enable the railroad to give improved service.

The cumulative preferred stock will be issued to raise funds for the same purposes and also to provide money for general corporate purposes.

If the plan is carried out, the second mortgage and adjustment mortgage bonds will be turned over to the "first lien holders" committee for the benefit of the present bondholders.

Boston "L" Has Largest Business in 1924

The Boston Elevated Railway, Boston, Mass., is operating to its financial advantage at the present time, but it lost \$336,696 during the fiscal year ended Dec. 31, 1924. Its losses were incurred during the first 10 months. Since Nov. 1 there has been an excess of receipts over the cost of service. The business of the Elevated during 1924 was the largest in the history of the company, both in the matter of total number of passengers carried and the total revenue. Such are the outstanding facts in the annual report which the public trustees of the road have submitted to the Legislature. Owing to the increases in wages, ordered in arbitration proceedings, the operating labor cost of the past calendar year amounted to \$17,358,670, an increase for the year of \$1,134,394.

Following the latest wage increase the company announced an increase in its 5-cent fares to 6 cents, and the

trustees believe that this extra cent will aid largely in meeting the extra cost, as riding does not appear to have diminished. They express the opinion that by the end of the fiscal year, June 30, the receipts will at least equal expenses.

Total receipts in 1924 were \$34,175,319 and the cost of service was \$34,812,016. The number of revenue passengers carried was 382,888,848. During 1924 there were 739,151 more revenue passengers carried than in 1923. Passenger revenue mileage was increased by 1,939,014 miles, in large measure due to increased use of one-man cars, which permitted an increased service without corresponding increase in cost. The one-man car and bus miles amounted to 31.7 per cent of the total surface miles operated. The increase in revenue passengers occurred on weekdays and Saturdays, there being a decrease of traffic on Sundays and holidays.

The operation of buses was increased. The miles covered in 1922 were 63,937 in 1923, 465,382, and in 1924, 890,901.

The accident record of the year has shown improvement. Operating expenses on this account were lowered from \$975,021 in 1923 to \$914,043 in 1924. Accidents per 1,000,000 miles operated with one-man cars were reduced from 230 in 1923 to 205 in 1924. Accidents per 1,000,000 miles operated with two-men cars were reduced from 259 in 1923 to 249 in 1924.

Supreme Court Holds Combination Is Not Illegal

Monopoly in the control and distribution of electric power in the State of Tennessee was held to be authorized by the statutes of the state by the Supreme Court, Jan. 24, in the case of the state on the relation of the Attorney-General vs. Nashville Railway & Light Company, et al.

This suit was instituted to dissolve a combination which had been effected between the Nashville Railway & Light Company, the Chattanooga Railway & Light Company, the Tennessee Power Company and the Chattanooga & Tennessee River Power Company, the voting power of all of which corporations had been by various purchases and arrangements vested in a holding company, called the Tennessee Electric Power Company of Maryland. By this combination the holding company had acquired control and indirect ownership of the hydro-electric power plants on the Caney Fork, Ocoee and Tennessee Rivers, and, as found by the court, had effected a unity of control in the distribution of electricity within all of the territory of Middle and East Tennessee covered by the transmission lines of the power company.

The Supreme Court was of the opinion that the statute creating the Public Utilities Commission and other statutes regulating public utilities and authorizing the organization and combination of public utilities companies have the effect of expressly authorizing monopoly in the production and distribution of electric power and service under the control of the Public Utilities Commission, which approved the combination under attack. The Su-

preme Court held, therefore, that the anti-trust laws forbidding combination in restraint of trade do not apply to the control of electric power.

The opinion of the Supreme Court in this case was delivered by Justice Cook, affirming the decree rendered by Chancellor James B. Newman of Nashville.

Wants to Abandon Portion of Tracks

The Westchester Electric Railroad, New York, N. Y., has filed with the Public Service Commission a petition for permission to abandon a portion of its route and franchise in the village of Tuckahoe on Yonkers Avenue and a portion on Main Street. A declaration of abandonment was adopted by the stockholders of the company on Dec. 24. The route of the Westchester company connects at the Bronx River with the route of the Yonkers Railroad on Tuckahoe Road in Yonkers.

The petition states that it is impracticable to make a physical transfer of passengers at the Bronx River, with the result that the Yonkers Railroad has been operating its cars over the Westchester company's Tuckahoe line beyond the tracks of the New York Central to Waverly Square in the village of Tuckahoe. The Yonkers company has applied for permission to abandon the portion of its route which is on Tuckahoe Road in Yonkers east of Nepperhan Station, and the Westchester company's petition sets forth that if this petition is granted there would be no longer any public convenience or necessity requiring the operation of its route on Main Street and Yonkers Avenue, Tuckahoe, between the New York Central tracks and the Bronx River. Convenience of the public would be better served, the company says, if any bus franchise granted for service on Tuckahoe Road in the city of Yonkers were extended along Yonkers Avenue and Main Street, Tuckahoe, to the New York Central Station.

Reorganization of Northern Ohio Electric Corporation Approved

At a meeting of the stockholders of the Northern Ohio Electric Corporation held on Jan. 27 there were represented 119,738 shares out of 135,000 shares of preferred and common stock outstanding. The plan for reorganization of the corporation, dated Dec. 30, 1924, and the contract for the sale of all of its assets in accordance with that plan were approved. The vote was 119,510 shares for and 228 shares against.

As 87.66 per cent of the outstanding stock has been deposited under the plan and 2.51 per cent additional has been pledged for deposit, a total of more than 90 per cent, the plan has been declared operative, subject to (a) the receipt of opinion of counsel approving the transfer of assets of the Northern Ohio Electric Corporation to the Northern Ohio Power Company and all legal details in connection therewith; (b) the payment for new securities of the Northern Ohio Power Company by the subscribers and underwriters, and (c) the delivery to depositaries of the securities of the new

company called for by receipts issued by such depositaries.

Subscriptions aggregating \$1,766,200 were received from depositors of preferred stock and these subscriptions will be allotted in full on the basis stated in the plan. Deducting this amount from the \$2,800,000 offered for subscription leaves \$1,033,800 applicable to the 75,000 shares of common stock as outlined in the plan, or \$13.79 per share on which basis allotments will be made in amounts of \$100 or multiples thereof, on subscriptions received from common stock holders.

In all cases where subscriptions were made on the full payment basis a call has been made for full payment on Feb. 18, 1925, and in all cases where subscribers elected at the time of making subscriptions to pay in installments a call of 15 per cent of the subscription allotted has been made, payable on Feb. 18, 1925, and for the payment of the remaining installments of 25 per cent each on April 1, 1925; June 1, 1925, and August 1, 1925.

The assets of the company taken over consist practically of all the outstanding \$10,000,000 of common stock of the Northern Ohio Traction & Light Company, which operates the city lines in Akron and an extensive system of interurbans.

Is San Francisco's Municipal Line Profitable?

San Francisco officials are at odds over the question as to whether or not the Municipal Railway is being operated at a loss. Supervisor J. B. McSheehy charges that the present system of handling the depreciation fund has made it appear that the road is losing money, whereas the road is making a net profit of \$41,000 a month. According to Mr. McSheehy, the depreciation fund is being diverted from its rightful purpose and being used for the construction of extensions.

The supervisor quotes figures to show that since the start of the road 12 years ago revenues have been \$25,942,219, with operating costs of \$17,541,623, leaving a gross profit of \$8,200,597. In addition, according to Mr. McSheehy, payments on account of funded debt have been \$2,374,962 and disbursements for accidents and damages \$258,708, leaving a net profit of \$5,466,927 for the 12 years.

This profit, Mr. McSheehy claims, has been entirely depleted by bond redemptions, loans to the general fund and additions and betterments. He urges as a remedy for this condition the establishment of a depreciation fund by setting aside 3 per cent of the road's gross passenger revenue.

Supervisor Shannon is not so sure about the feasibility of this plan. M. M. O'Shaughnessy, city engineer, is studying plans for six extensions made necessary by the recent growth in population. These improvements cannot be long delayed if proper service is to be maintained. Mr. Shannon is of the opinion that a bond issue may be necessary to expedite the construction of these extensions unless the McSheehy plan is found feasible.

There are other elements in the city that claim that the road is steadily

losing money and that it will be necessary to raise fares to the 6-cent level to make the road pay.

This conclusion is assailed by the carmen, who have asked for an increase in pay, and is also frowned on by most of the supervisors, many of whom will come up for re-election in the spring. The labor element is with the carmen. It favors the McSheehy plan to establish a 3 per cent fund taken from the gross passenger revenue.

Supervisor Ralph McLaren, it must be remembered, has a plan that calls for the establishment of a 4 per cent fund.

These plans are all held in abeyance pending the report to be made by the city engineer after he has studied the immediate needs of the city, has estimated their costs and has made his recommendations.

Issue of Stock Approved.—The Board of Public Utility Commissioners of New Jersey has approved the application of the Atlantic Coast Transportation Company, Asbury Park, N. J., to issue \$1,000 of capital stock. This is a bus line controlled and operated by the Atlantic Coast Electric Railway.

Reduced Valuation Case Scheduled.—The suit of the city of Rochester, N. Y., to reduce the valuation of the Rochester lines of the New York State Railways under the service-at-cost contract is scheduled to come up in Equity Term of the Supreme Court early in March. Justice John B. M. Stephens will preside.

Wants to Abandon Line.—The North Randall Railway, Cleveland, Ohio, recently applied to the Public Utilities Commission at Columbus to abandon its line from the end of the Broadway city line to the North Randall racetrack. Win L. Kinnan, president, said that the company lost \$1,600 last summer, was now losing \$700 a month, and owed the Cleveland Railway, which operates it, \$30,000.

Revenues Decreased.—A decrease of \$211,543 in revenue compared with 1923 is the result of 1924 operation of the Oklahoma Railway, Oklahoma City, Okla. The city lines received \$133,622, or 14.2 per cent less than in 1923, while the decrease on the interurban operation was \$77,921, or 12.81 per cent. Revenues for December, 1924, shows an increase over December, 1923, attributed to the extreme cold weather.

Authorizes Stock Sale.—The Alabama Public Service Commission has recently granted permission to the Birmingham Electric Company, Birmingham, Ala., to issue and sell 70,000 shares of non-par value preferred stock, paying annual dividends of \$7 a share. The stock is to be sold so as to net not less than \$90 and accrued dividends per share. Proceeds of the sale will be used to pay for various improvements.

No Fatal Accident in Altoona.—The Altoona & Logan Valley Electric Railway, Altoona, Pa., during 1924 carried 18,949,702 passengers without a single fatal accident, according to the annual report of S. S. Crane, general manager. A total of 679 accidents was reported, of which 553 were due to automobiles backing on the track or "beating" a car to a corner. The company owns more

than 58 miles of car line and during 1924 operated 2,883,000 car-miles. The payroll for the year was \$589,358, with an expenditure of \$167,349 for track maintenance and \$80,167 for equipment maintenance.

Extra Dividend by Holding Company.—The Railway, Light & Securities Company, Boston, Mass., has declared an extra dividend of \$1 a share on the common stock and the regular semi-annual dividends of \$3 a share on the common and preferred stocks. The dividends were paid on Feb. 2 to holders of record of Jan. 15.

Seeks Authority to Remove Trackage.—The Pacific Electric Railway has applied to the California Railroad Commission for authority to abandon and remove its tracks on the West Colorado Street and Orange Grove Avenue line, Los Robles Avenue and Washington Street line and the California Street line in the city of Pasadena. Motor coach service has been substituted.

Report on Electric Roads Tax Returns.—Of the 138 electric railroad companies making income tax returns in 1922, 62 paid cash dividends during the year of \$11,904,765. With 38 companies which did not pay cash dividends they had surplus and undivided profits at the close of the year of \$42,599,884. The net taxable income reported by the 138 concerns was \$25,570,140.

Asked to Deposit Bonds Separately.—Holders of both the 5 per cent first mortgage bonds of the Indianapolis Northern Traction Company and 5 per cent general mortgage bonds of the Union Traction Company of Indiana are being asked to deposit the bonds with separate depositories. This request is made so that committees may be appointed to conserve the interests of the holders of the respective bonds.

Wires But Not Tracks Removed.—Samuel Goldman, Woonsocket, R. I., who purchased all the equipment of the Medway & Dedham Street Railway, Dedham, Mass., which suspended operation several weeks ago, has completed the work of removing all feed wires. No plans have been made for removing the rails because the towns through which the trolley passes have declared that if they are removed the streets will have to be restored at the expense of the person who removes the rails.

December Shows Profit.—Profits of approximately \$69,000 in excess of expenses are shown in the report for December, 1924, filed by the Cincinnati Traction Company with W. Jerome Kuertz, Director of Street Railroads of Cincinnati. The receipts from all sources aggregated \$848,264, while the total expenditures were \$779,180. The expenditures were as follows: Operations, \$484,970; taxes, \$68,154; deductions and bonds, \$16,150; rentals and leases, \$104,030; interest and sinking fund, \$40,842; return on capital, \$134,117. Of the last item \$35,043 was for December and the remainder represents payment on account due the company as return on capital provided for under the present ordinance. There is still due the company \$181,287. The company recently borrowed \$437,500 to pay the franchise tax due the city from October, 1923, to Dec. 31, 1924.

Preferred Stock for Sale.—A syndicate headed by Dillon, Read & Company, New York, is offering at \$100 per share to yield 7 per cent \$3,000,000 of 7 per cent cumulative first preferred stock, known as series A, of the Ohio Public Service Company, Mansfield, Ohio. Among its properties this company operates the city lines in Mansfield and the interurban lines connecting Mansfield and Shelby.

Net Income Increases.—For the 6 months period ended Dec. 31, 1924, the total operating revenue of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., was \$21,448,951, against \$19,576,898 for a similar period in 1923. The expenses increased from \$13,001,474 for the last six months of 1923 to \$13,968,699 for the last six months of 1924. The net income, however, increased. It was \$1,836,712 for the 1923 period and \$2,598,518 for the period from July to December, 1924.

Massachusetts Road Does Better.—The Gardner-Templeton Street Railway, East Templeton, Mass., is now free of debt. On Aug. 1, 1924, the line was \$3,000 in debt. In December the road cleared \$1,026 above expenses. Checks have been sent out paying every debt of the company, according to Edgar A. Shephardson, Baldwinville, the acting president. The company expects two new cars soon as part of the equipment included in its modernization plan. The tracks were all put in good condition during the summer and fall.

Buses May Be Substituted.—The Black River Traction Company, Watertown, N. Y., is reported to have offered to buy the fleet of buses, garages and equipment of the Watertown Transportation Company. The railway's apparent intention is to replace the trolleys with buses.

Net Income Increases.—For the 12 months period ended Dec. 31, 1924, the Philadelphia Rapid Transit Company, Philadelphia, Pa., had a net income of \$1,810,365. The year before the net was \$1,800,000. The passenger revenue increased from \$44,249,361 to \$45,002,700 for the 12 months period of 1924. The passengers carried showed a falling off—the number being 917,787,235 for the period from January to December, 1923, and 909,303,945 for the period of January to December of last year. Following the meeting of the company in March a more extended review of the operations during the past year will be given.

Traffic and Revenue Decrease.—The gross income of the Grand Rapids Railway, Grand Rapids, Mich., during the past year was \$672,157, a decrease of \$24,263 over 1923. Passenger revenue in 1924 totaled \$1,719,562, a decrease of \$34,738. Passengers carried totaled 24,825,018, a decrease of 3,733,839 over 1923. Car mileage during 1924 totaled 3,727,767 miles. The equalization account at the end of the year showed a deficit of \$143,081.

Receipts Show Falling Off.—Receipts of the street railway department of the Georgia Railway & Power Company, Atlanta, Ga., decreased at the rate of \$1,200 a day during the last 6 months of 1924 as compared with a similar period in 1923. The total decrease was \$221,022 compared with a similar period in 1923. For the first

6 months of 1924 receipts were \$9,072 less than for the first half of 1923, making a total decrease of more than \$230,000 in receipts for the year as compared with receipts in 1923. Officials estimate that the railway department of the Georgia Railway & Power Company carried 3,361,410 fewer passengers in 1924 than it did in 1923, and attributed this loss largely to unregulated jitney and bus competition.

Company in New Hands.—Acquisition of the properties, rights, privileges and franchises of the Gulfport & Mississippi Coast Traction Company, Gulfport, Miss., by the Mississippi Power Company was announced recently. The consideration was not made public. The traction company, a \$2,000,000 concern, operates 30 miles of car tracks in Harrison County and furnishes illuminating current to Gulfport, Longbeach, Mississippi City, Biloxi, Pass Christian and Ocean Springs. Barney E. Eaton, general attorney for the Gulf & Ship Island Railroad Company, is president of the Mississippi Power Company.

Opposes New Power Line.—The Holyoke Water Power Company maintains that it is the logical concern to supply power to the Holyoke Street Railway, Holyoke, Mass., and will oppose the entrance of the Turners Falls Company into its territory. Consequently the question has gone to the Massachusetts Department of Public Utilities. Some time ago the stockholders of the Holyoke Street Railway ratified the action of the board of directors in arranging for the sale of the railway power plant to the Turners Falls Power Company. The terms of the agreement were mentioned in the *ELECTRIC RAILWAY JOURNAL*, issue of Nov. 22.

Six-Month Period Shows Deficit.—The total revenue of the Interborough Rapid Transit Company, New York, N. Y., for the 6 months ended Dec. 31, 1924, was \$28,552,713, an increase of \$469,792 over a similar period of 1923. The operating expenses, including taxes and rentals, were \$18,967,226, a decrease of \$428,608 over the 6-month period ended Dec. 31, 1923. The income available for all purposes was \$9,004,927. In the similar period of 1923 the income was \$7,247,292. After the consideration of fixed charges, reserve and dividend rental the result showed a deficit of \$248,517. The balance in the period from July to December, 1923, was an increase of \$1,278,650 over that figure.

Deposits Increased.—For the year ended Dec. 31, 1924, the co-operative welfare association saving fund of the Philadelphia Rapid Transit Company, Philadelphia, Pa., showed receipts of \$1,789,209. The total disbursements were \$1,762,243. The cash balance on Dec. 31, 1924, was \$26,966. The cash balance on Jan. 1, 1924, was \$9,899. Interest at the rate of 5 per cent per annum credited to depositors' accounts for the year 1924 amounted to \$98,319. Mr. Farley, president of the association, told fellow directors at the close of his term as president that the deposits had increased more than \$200,000 during the year just ended. At the same time the membership in the fund had increased more than 1,400, to 9,792.

Legal Notes

CALIFORNIA.—*Negligence of Employer of Injured Person Not a Defense.*

The employee of a gas company, while laying pipe in the street, was injured by a trolley car. Damages were collected by his heirs from the gas company under the workmen's compensation act and suit was then brought against the railway company for a larger amount. The court held that on any damages collected from the railway company, the gas company had a first lien up to the amount paid to the employee under the compensation act, but that the railway company could not interpose as a defense the contributory negligence of the employer in order to defeat the plaintiff's claim to the extent of the amount of compensation paid by the employer under the compensation act. (*Milosevich et al. vs. Pacific Electric Railway*, 230 Pacific Rep., 15.)

CONNECTICUT.—*Burden on Plaintiff to Show Liability Under Last Clear Chance Doctrine.*

A person was killed at night while on trolley tracks which were close to the traveled portion of a country road. To warrant the assessment of damages against the company, the burden of proof is on the plaintiff to show that the motorman ought to have become aware while there was time to avoid accident of the presence of the deceased on the track. (*Polna vs. Connecticut Co.*, 126 Atlantic Rep., 529.)

GEORGIA.—*Franchise Ordinance Which Was Accepted Held to Be Enforceable Contract.*

A franchise called for the construction of electric railway lines in a city and suburbs and also provided for a gas and electric service. The latter was profitable, but the company did not build the suburban railway extension specified. It put on a bus line in its place and claimed that the State Railroad Commission had jurisdiction in the case. The position of the city, demanding complete compliance with the franchise, was upheld. (*City of Spartanburg et al. vs. South Carolina Gas & Electric Co. et al.*, 125 Southeast Rep., 295.)

MASSACHUSETTS.—*Contract by Street Railway to Pay Annual Sums for Locations Held to Relate to Taxation and Be Invalid.*

In 1902 a railway agreed to pay a town \$900 annually "with such sum in excess thereof as would equal its excise tax payable to said town for all its tracks therein located in public ways." A considerable part of the line was on private right-of-way, but later, it absorbed a local railway with considerable track on the highway. Up to 1920, the amount levied and paid as an excise tax on the combined property exceeded the sum of \$900 a year. In 1919 the legislature passed a statute that no further excise taxes should be collected of street railway companies. The town attempted to collect from the

company after that year on the ground that the payment was not an excise tax, but the court decided otherwise, and held that taxation is a function of the general legislative department of the state, and laws established by it cannot be waived or changed by municipalities or their officers. (*Inhabitants of Southborough vs. Boston & W. Street Ry.*, 145 Northeast Rep., 422.)

MASSACHUSETTS.—*To Move Car from One Berth to Another Not Negligent.*

The plaintiff was waiting on a subway station platform when the car she expected to take stopped at one berth, but before the doors were opened, it moved to another berth. The plaintiff was thrown down and injured by the crowd which rushed first to the first boarding point and then to the second, but no negligence on the part of the company was shown. (*Alward vs. Boston Elevated Railway*, 125 Northeast Rep., 332.)

MICHIGAN.—*Decision of Public Utility Commission Upheld in Telephone Case.*

A public utility company is entitled to earn enough to meet the continuous depreciation of its plant and equipment and to provide funds from earnings to offset this depreciation. Such a fund is the property of the utility, and it has the right to invest this fund and earn on it, and such fund should not be deducted from present fair value in fixing a rate base. Upon the issue of confiscation in the fixing of rates, a federal question, decisions of the United States Supreme Court control. The allowed rate of depreciation, 4 per cent on total fair value, less land and right-of-way, though small, was not confiscatory. (*Michigan Public Utilities Commission vs. Michigan State Tel. Co.*, 200 Northwest Rep., 750.)

MISSOURI.—*Police Patrol Wagon Has Paramount Right of Way.*

A police patrol wagon, answering a call, approached a place on the street where there were island platforms for the use of street railway passengers. The driver of the patrol wagon would have kept on the outside of the island platform on his side of the street except that the street was very narrow at this point because of building operations and a pedestrian attempted to cross in front of the wagon. It was therefore turned into the space between the loading platforms and struck a street car coming in the opposite direction and just entering its berth. The company was held responsible because the motorman of that car should have stopped it at the approach of the patrol wagon. (*Hogan vs. Fleming et al.*, 265 Southwest Rep., 875.)

VERMONT.—*Priority of Claim Against Insolvent Railway Company.*

The Supreme Court of Vermont ruled as follows in regard to various claims against an electric railway com-

pany in the hands of a receiver. The franchise required the company to pave the track area and authorized the city to do the work and charge the cost to the company if the company failed to do so. It did not provide for any special lien on the company's property, in case the company failed to pay for the work, but the company had to file a bond with the council, conditioned upon the faithful performance of its duties and obligations under its franchise. This bond was filed for the company before it became insolvent by a surety company, which recompensed the city for its paving charges after the company became insolvent and then set up a claim for priority of this indebtedness because of its nature. This claim was brought in the name of the city but its priority was denied by the court. The claim of the state of Vermont for taxes, based on the value of the company's property which included franchise rights, was held entitled to priority in receivership proceedings. An injured passenger who had attached property of the railway was held to have a lien prior to existing mortgages thereon, under the Vermont statute. The principal other claims were those of a power company, which owned approximately 90 per cent of the capital stock of the railway company, and sued for payment on various claims. It was shown that practically all of the directors and to some extent the other officers of the two corporations were the same persons during the time that the claims of the power company accrued. One of these claims was for office rent and office accounting; another was for expressage, freight, labor and supplies. Another was for power furnished. Another was for funds advanced. All of these claims were judged according to the criterion of whether they were "services rendered or materials furnished for the purpose of keeping the road in repair or in running the same." Tested by this rule, office rent, clerk hire, book-keeping, funds advanced, and express and freight charges paid were classified by the court as unsecured claims, but electric current for power and lighting was classified as material furnished and received preference. Other lesser claims not given priority were for legal services, printing, telephone rentals, clearing snow from the tracks and premiums on an insurance policy to cover workmen's compensation liability. On the other hand, a claim from a manufacturing company for supplies for repairs of electrical machinery was entitled to preference. (*Westinghouse E. & M. Co. vs. Barre & Montpelier Traction & Power Co. et al.*, 126 Atlantic Rep., 594.)

WISCONSIN.—*Duty at Street Railway Crossing.*

Where a person crosses street car tracks and knows, or could know in the exercise of ordinary care, that a trolley car is approaching at an excessive rate of speed, he must act accordingly. It is not sufficient that he should assume that the car is approaching at a reasonable and lawful rate of speed. (*Balistreri vs. Chicago, N. S. & M. R.R.*, 200 Northwest Rep., 650.)

Personal Items

J. P. W. Brown Most Valuable Citizen

**Electric Railway Official at Nashville
So Pronounced and Signally
Honored for Outstanding
Civic Service**

John P. W. Brown, general superintendent of the Nashville Railway & Light Company, Nashville, Tenn., and Lieut. John Harding, Jr., Nashville's around-the-world flier, were jointly honored by the citizens of Nashville on Jan. 2 at a meeting of the Kiwanis Club at the Chamber of Commerce at noon.

Mr. Brown was awarded the Kiwanis loving cup in recognition of his outstanding civic service to Nashville during 1924.

Newspapers printed columns of the praises that were sung of Mr. Brown. It is timely to recount in summary the work which won for him the honor of "Nashville's ideal citizen." The title was given him because:

He led the 1924 Community Chest campaign to the most successful completion of its history.

He was chairman of the Industrial committee of the Chamber of Commerce, and thus helped bring new industries to Nashville.

He did outstanding religious work as president of the Personal Workers of the First Presbyterian Church.

He was an active member of the board of directors of the Nashville Y.M.C.A., and in such work did valuable service to the young men of this city.

His division won first honors in the Vanderbilt "Fill the Stadium" drive.

And last: Serving with equal unselfish zeal in the ranks as an enthusiastic worker, his forceful efforts have constantly been attended by unflinching success, and an unflinching modesty.

Naturally the question arises, "What manner of man is it upon whom Nashville has conferred her greatest honor in the award of the pronouncement of him as its most valuable citizen?" John P. W. Brown became connected with the electrical industry in Nashville 27 years ago when he supervised the inspection of installations of all electric lighting, power and scenic effects at the Tennessee Centennial Exposition immediately upon the completion of his work at Vanderbilt University. He became identified with the Cumberland Electric Light & Power Company as switchboard operator in 1898, and 2 years later, when the Cumberland company was merged with the railway and became the Nashville Railway & Light Company, Mr. Brown was made superintendent of the lighting and power departments of the new company.

On May 19, 1917, Mr. Brown was promoted to the position of assistant general superintendent over the entire local railway and light property, and 5 years ago succeeded B. C. Edgar as general superintendent of the company, which position he still holds. That Mr. Brown's position has been one of increasing responsibility year by year is attested by the fact that when he entered the employ of the company only 300 light and power customers were



J. P. W. Brown

being served, while at present the Nashville Railway & Light Company has more than 34,000 electric consumers on its power lines. In fostering that growth Mr. Brown played a most important part.

That his value and services have been appreciated is evidenced by his last elevation to the position of general superintendent of the Nashville property.

Transportation Department Divided in Detroit

A separation has been made by the Department of Street Railways, Detroit, Mich., of the duties of the transportation division of the property. The work relating strictly to routing, schedules, traffic, etc., has been taken over by a newly created traffic division, and the duties pertaining strictly to the operation of the cars has been taken over by a newly created operating division, so that the transportation division no longer exists.

E. S. Rider, formerly superintendent of transportation, has been appointed superintendent of traffic, in charge of the traffic division.

D. A. Smith, formerly assistant superintendent of transportation, has been appointed superintendent of operation, in charge of the operating division.

E. R. Hughes was elected chairman of the Oklahoma Corporation Commission on Dec. 29, 1924. Mr. Hughes was elected to the commission in 1920 and has two years yet to serve. He succeeds Joe Cobb as chairman.

Lord Ashfield, chairman of the London underground railway companies, has been appointed chairman also of the British Dyestuffs Corporation, Ltd., in succession to Sir William Alexander, M. P., who has resigned on account of his increasing business and political activities. Lord Ashfield has hitherto been a government representative on the board of the company, a position he now vacates in order to become chairman. Besides being chairman of the London underground railway he is

chairman of the London General Omnibus Company, and he is associated with the boards of the Provincial Cinematograph Theaters, Ltd., the Midland Bank, the United Railways of Havana and Regla Warehouses, Ltd., and the Mexican Railway.

Consulting Engineer Resigns From General Electric

David B. Rushmore, one of the consulting engineers of the General Electric Company, has resigned following orders from his physician to take a long rest and avoid desk work.

Mr. Rushmore has served 25 years with the General Electric Company and with the Stanley Electric Company of Pittsfield, which was absorbed by the General Electric Company. He went to Schenectady in 1905, and for many years was engineer of the power and mining department. Since 1922 he has been one of the consulting engineers. Previous to his service with the General Electric Company, Mr. Rushmore was with the Westinghouse Electric & Manufacturing Company and later with the Royal Electric Company, Montreal.

He was graduated from Swarthmore College in 1894 with the degree of bachelor of science and engineering, and from Cornell University in the following year in the electrical engineering course. In 1897 he received the degree of civil engineer from Swarthmore, and in 1923 the honorary degree of doctor of science from that institution.

Changes in Stone & Webster Managerial Personnel in South

Howard C. Foss has assumed active supervision of the affairs of the Savannah Electric & Power Company, Savannah, Ga., as president, thus establishing a local president in charge of the operations of another of the large companies under Stone & Webster executive management. Because of the additional responsibilities assumed by Mr. Foss, his duties as Southeastern district manager for the Stone & Webster companies will be assumed by Alba H. Warren, now manager of the El Paso Electric Railway, El Paso, Tex. The Southeastern district office will remain in Savannah. Mr. Warren will take up his work there within a few weeks.

Robert C. Brooks, formerly manager of the Savannah Electric & Power Company, has been appointed manager of the Pawtucket division of the Blackstone Valley Gas & Electric Company at Pawtucket, R. I.

Tom P. Walker, formerly manager of the Baton Rouge Electric Company, Baton Rouge, La., has been appointed manager of the El Paso Electric Railway, El Paso, Tex.

J. F. McLaughlin, general superintendent of the El Paso Electric Railway, El Paso, Tex., is to succeed Mr. Walker at Baton Rouge.

Alfred F. Townsend, manager of the Eastern Texas Electric Company, Beaumont and Port Arthur, Tex., has been appointed vice-president and general manager of the operating subsidiary companies of the Western United Corporation with headquarters at Aurora, Ill. These subsidiary companies have

recently signed contracts with Stone & Webster, Inc., Boston, Mass., for its executive management service.

J. G. Holtzclaw, receiver and formerly manager of the Pensacola Electric Company, Pensacola, Fla., succeeds A. F. Townsend as manager of the Eastern Texas Electric Company.

J. A. Phelan, for the last 4 years general superintendent of the Rockford City Traction and Rockford & Interurban Railway properties, Rockford, Ill., has resigned to accept a position as head of the time-table department of the Chicago Motor Coach Company.

Charles W. Dupuis, president of the Citizens National Bank, Cincinnati, Ohio, has been elected president of the Cincinnati Street Railway, operated under lease by the Cincinnati Traction Company. Mr. Dupuis succeeds Bayard L. Kilgour.

James Dalrymple, general manager of the Glasgow Corporation Tramways, Glasgow, Scotland, after an absence of 2 months on a visit to Bombay, has returned to Glasgow. He went to Bombay on the invitation of the tramway there to inspect the undertaking and to advise on its conduct.

Gen. Harvey Hannah was made chairman of the Tennessee Railroad & Public Utilities Commission at the recent reorganization meeting. Gen. Hannah has been on the commission several terms. Dorsey B. Thomas, formerly in the State Senate from Benton County, has been made secretary.

C. L. Henry, president of the Indianapolis & Cincinnati Traction Company, Rushville, Ind., was re-elected president of the Indiana Public Utility Association at the annual convention held in Indianapolis on Jan. 22.

Charles B. Thomas, East St. Louis, Ill., former referee of bankruptcy for the Eastern Illinois federal court, resigned on Jan. 17 as special counsel for the receiver of the Alton, Granite & St. Louis Traction System.

S. C. Waggoner is road supervisor of the Indianapolis & Cincinnati Traction Company, with office in Rushville, Ind. He succeeds D. S. Petro.

Fred Capshaw has succeeded Joe B. Cobb as a member of the Oklahoma Corporation Commission. Mr. Cobb was chairman of the commission. He has been admitted to practice law in Oklahoma.

Clyde B. Aitcheson of Oregon has been elected chairman of the Interstate Commerce Commission for 1925. He succeeds Henry Clay Hall. The chairmanship is filled anew each year on a seniority basis from the membership of the commission.

L. C. Bullington, formerly assistant manager of the power department of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has been appointed manager of the Cincinnati district office. Mr. Bullington succeeds James A. Brett, who died recently in Bermuda. Mr. Bullington goes to Cincinnati, after a long connection with the Westinghouse company, first as southeastern manager with headquarters at Atlanta, Ga., and later as manager of the Buffalo district branch.

Dwight Dean Joins Forces of Motor Manufacturer

Dwight B. Dean, who recently joined the forces of the Yellow Coach Manufacturing Company, Chicago, with headquarters of his own at Cleveland, is one of the best known men in the electric railway industry in the central West, particularly the selling field. He has been an attendant at the annual conventions of electric railway men since 1889, the year the predecessor to the American Electric Railway Association met in Minneapolis. At that time Mr. Dean was employed as a salesman by the Electric Merchandise Company, Chicago. Consumer resistance was not known by that name then, but it existed in a superlative degree, as Mr. Dean quickly learned. He broke this resistance down so successfully for the Chicago company that the McGuire Company of the same city was quick to appreciate his ability and to send him out to sell car trucks. This was in 1891. Two years later he joined the forces of the Terre Haute Car & Manufacturing Company as sales manager of the street railway car wheel department.

Mr. Dean had learned so well how to induce his prospect to sign on the dotted line, as they say, that he was now directing others in the art of doing business successfully. For 7 years he remained with the Terre Haute company. In 1900 Mr. Dean again changed his job, but not his allegiance. He became connected with the J. G. Brill Company in charge of its Chicago office and Western territory. It was a good stroke for Mr. Dean and a better one for the Brill company. Mr. Dean's scope of activity was enlarged and the car manufacturer secured the services of a man who had proved his ability by more than 10 years of intensive work among people in an industry of which the car manufacturer was a part. Three years later the Brill company purchased the G. C. Kuhlman Car Company at Cleveland and Mr. Dean moved to Cleveland as sales manager. There he has continued ever since, a period in all of 24 years with the Brill interests.

Thomas F. Woodlock, New York, has been nominated by President Coolidge to be a member of the Interstate Commerce Commission, vice Commissioner Potter, resigned. Mr. Woodlock was born in Ireland in 1866. He was educated at Beaumont College, near Windsor, England, the Catholic public school corresponding to such schools as Eton and Harrow. He matriculated at the London University in honors. He went into business in the London Stock Exchange. In 1892 he came to New York and joined the late Charles H. Dow and Edward D. Jones in the Dow-Jones News Service. He immediately specialized on American railroads. His pamphlet on "The Anatomy of a Railroad Report" is still a textbook on the subject. After the death of Charles H. Dow, in 1902, he became the editor of the *Wall Street Journal*, which post he held until 1905. After his resignation he became a member of the New York Stock Exchange, in partnership with Schuyler N. Warren. After a few

years he returned to newspaper work and economic writing, chiefly in connection with railroads.

J. D. Michele has been retained by the Youngstown & Suburban Railway as manager of its bus division, following the purchase by the company of the Canton-Youngstown Safety Coach Line. Mr. Michele entered the bus business in 1914, operating a line between Cleveland and Akron, Ohio. This was the beginning of the Cleveland-Akron Bus Company, which is now one of the principal bus enterprises of the state.

H. E. McWethy, for the past 3 years electric railway engineer for the Minnesota Railroad & Warehouse Commission, has opened an office in the Builders Exchange Building, St. Paul, Minn., to engage in practice as an engineer-statistician. He purposes to handle public utility rate analyses and valuations for presentation before public service commissions and courts and for purposes of stock and bond issues. Mr. McWethy received his technical engineering training at the University of Wisconsin, and was graduated from the College of Electrical Engineering in 1909. Then followed 2 years apprenticeship training with the Westinghouse Electric & Manufacturing Company at East Pittsburgh. In 1911 he became associated with the Wisconsin Railroad Commission at Madison, and served with this commission as a valuation engineer and rate expert until 1920. From 1920 to 1922 he was engaged as an appraisal expert in the valuations of the Nashville Railway & Light Company at Nashville, Tenn., the Philadelphia Rapid Transit Company, and for other properties. In 1922 he was retained by the Minnesota Railroad & Warehouse Company as its expert adviser in the valuation proceedings involving the electric railway systems of the Twin Cities and Duluth.

Obituary

Oliver P. Balliet, one of the first engineers of the plant of the Allentown & Reading Traction Company, Allentown, Pa., died Jan. 10 at his home in Forrest, Ohio. He was at the time of his death general manager of the Hardin Electric Power Company.

Col. Jorgen Ording, who as draftsman and engineer assisted in the construction of the first cable car lines of Denver, Col., died recently at Christiansand, Norway.

William C. Kelly, a pioneer in elevated railroad service in Chicago, died on Feb. 1, following an illness of about 3 months. He was 67 years old. During the World's Fair in Chicago Mr. Kelly was employed by the intramural railroad, the first electrically operated elevated railroad, and at the close of the fair became associated with the Metropolitan West Side Elevated Railroad, with which he was connected until the time of his death. He aided in the construction of the road, which was begun in 1894. Mr. Kelly was one of the oldest employees in point of service with the present Chicago Rapid Transit Company.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Differential Steel Car Company Receives Traction Orders

The Cleveland Railway, Cleveland, Ohio, placed an order recently with the Differential Steel Car Company of Findlay, Ohio, for four standard motor-equipped Differential door chute cars, two standard trailer Differential door chute cars, two flat rail cars and four crane cars of a new type just designed by the Differential Steel Car Company. The Boston Elevated Railway has also placed an order with the Differential Steel Car Company for one Clark concrete breaker and the Key System Transit Company, Oakland, Cal., has ordered one Clark concrete breaker.

Buses Not Included Among White Price Reductions

No changes in the prices of bus chassis or of heavy-duty trucks are included in the reductions ranging from \$250 to \$300 announced in certain White Motor Company products. In short, the reductions affect four of the ten White models, including both 2-ton and 4-ton models.

Factory expansion and improvement in manufacturing methods have made reductions possible, it is explained. Some savings have been made in the cost of manufacturing light-duty trucks and these are being passed along to customers. With the beginning of the new year the company completed a program of expansion which greatly increased manufacturing facilities. This included the erection of the new engineering and research building as well as the acquisition of all buildings adjacent to the truck factory formerly occupied by the White Sewing Machine Company.

Cos Cob Station Enlarged

The use of nothing but electric locomotives on the New York, New Haven & Hartford Railroad between New York and New Haven has made necessary certain changes in the generating station located at Cos Cob, Conn. A new 9,000-kw. turbine and condenser will be used to replace one of the 3,750-kva. turbo-generators, which will be used in some other part of the power system. The contract for the equipment has been awarded to the Westinghouse Electric & Manufacturing Company.

Louisiana Utilities Spend Large Sums for Improvements

The 1924 report of the committee on public utility information showed that the public utilities of Louisiana and Mississippi expended more money on improvements than in any previous year. The New Orleans Public Service, Inc., occupied first place on the list,

with \$8,000,000. The Shreveport Railways spent \$200,000 in improvements, \$25,000 for special work for new car houses and shops, \$35,000 for an automatic substation and a 3-mile feeder and \$7,700 for paving. Three new cars were added to its equipment. The South New Orleans Light & Traction Company of Algiers made improvements to the sum of \$28,173. The Baton Rouge Electric Company, Baton Rouge, made improvements that cost \$464,454 to its plant, including an addition of 3.05 miles of track and five new cars.

Cement Production Increased

Figures on portland cement production for 1923 and 1924 show an increase of about 8 per cent. Production figures by districts are shown in the accompanying table.

Commercial District	1924	1923
Eastern Pennsylvania, New Jersey and Maryland	38,281	35,722
New York	7,547	6,990
Ohio, Western Pennsylvania, West Virginia	14,322	13,496
Michigan	9,162	7,620
Wisconsin, Illinois, Indiana, Kentucky, Alabama, Tennessee, Georgia	21,856	21,193
Eastern Missouri, Iowa, Minnesota, South Dakota	11,347	7,909
Western Missouri, Nebraska, Kansas, Oklahoma	14,851	14,047
Texas	9,912	9,779
Colorado and Utah	4,566	4,179
California	2,425	2,428
Oregon, Washington, Montana	11,615	11,002
	2,975	3,105
	148,859	137,460

American Brass in Waterbury

It was erroneously stated in the ELECTRIC RAILWAY JOURNAL, issue of Jan. 10, that the office of the American Brass Company was in Bridgeport, Conn. The company has neither a mill nor an office in that city. Its general offices are located in Waterbury.

G. E. Welcomes Investigation

No action has been taken in the United States Senate on the resolution of Senator Norris ordering an investigation of the General Electric Company on the ground that it monopolizes or controls electric light and power company business. The resolution was returned to the Senate by its interstate commerce committee in a modified form. It had been planned to take up the resolution on Feb. 5, but consideration of the nomination of Attorney-General Stone to be a Justice of the Supreme Court prevented. Such an investigation would be welcomed by the company, according to Owen D. Young. In spite of the trouble and expense involved such a step is preferable to having unfounded charges made, he said.

Rolling Stock

San Diego Electric Railway, San Diego, Cal., has purchased 16 flat cars of the Union Pacific Railway for freight business. The equipment of the freight department will be augmented by an up-to-date 60-ton electric locomotive from the Westinghouse Electric & Manufacturing Company, Pittsburgh.

Union Traction Company, Coffeyville, Kan., it is reported, has purchased several one-man interurban motor cars.

San Antonio Public Service Company, San Antonio, Tex., plans to purchase a few light-weight double-truck street cars during the present year. The details of the purchase have not been made public.

Wilmington & Philadelphia Traction Company, Wilmington, Del., it is reported, has purchased eight Reo pay-enter buses for service in the city of Chester. The traction company was given the exclusive franchise subject to furnishing equipment by Jan. 9.

Track and Line

Houston, Tex.—Contract for the construction of the 110-mile electric interurban line of the Houston, Beaumont & Orange Interurban Railway has been awarded to W. H. Nichols & Company, railroad constructors, according to Ed Kennedy, promoter of the project. The contract stipulates that the work will be started not later than March 20. The terms of the contract are understood to be cost plus 10 per cent. The cost of completing and putting the line into operation was estimated by R. E. Gurley, chief engineer, at \$5,333,062, or nearly \$60,000 a mile.

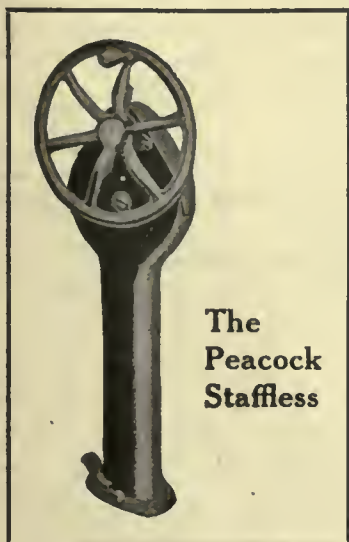
St. Louis-Kansas City Short Line Railroad, through Lee Dunlap, vice-president, applied to the Missouri Public Service Commission at Jefferson City, Mo., Jan. 28 for permission to build an interurban electric railway between St. Louis and Kansas City. The tentative date for a hearing on the application is Feb. 11. The plans of the company call for a standard gage, electrified double-track railroad. It plans to operate both freight and passenger trains. Promoters of the railroad claim the proposed route will be 40 miles shorter than any steam railroad operating between St. Louis and Kansas City.

Metal, Coal and Material Prices

Metals—New York	Feb. 3, 1925
Copper, electrolytic, cents per lb.	14 625
Copper wire base, cents per lb.	17 00
Lead, cents per lb.	9 60
Zinc, cents per lb.	7 71
Tin, Straits, cents per lb.	57 00
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.	\$4 275
Somerset mine run, Boston, net tons.	2 125
Pittsburgh mine run, Pittsburgh, net tons.	1 95
Franklin, Ill., screenings, Chicago, net tons.	1 625
Central, Ill., screenings, Chicago, net tons.	1 325
Kansas screenings, Kansas City, net tons.	2 50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	\$7 25
Weatherproof wire base, N. Y., cents per lb.	20 00
Cement, Chicago net prices, without bags.	2 10
Linseed oil (5-lb. lots), N. Y., per gal.	\$1 24
White lead in oil (100-lb. keg), N. Y., cents per lb., carload lots.	0 1297
Turpentine (bbl. lots), N. Y., per gal.	0 95

Features in Brake Design

That you should consider before buying



- Light weight
- Least Platform Space
- Maximum Braking Power
- Ample Chain Winding Capacity
- Reliability
- Low Maintenance Costs

Peacock Staffless Brakes combine all these features and in addition the best feature of all—SAFETY.

It is no coincidence that Peacock Brakes are almost always found on rolling stock which has been designed under the independent direction of engineering experts.

Such men analyze the features with the same keen insight as the banker will

analyze the features of a bond—they consider it from every angle, and the result is that specifications call for Peacock Brakes.

It's not a matter of looks, finish, sentiment or even first cost. It's a question of getting a dependable hand brake combining the essential features, with an established reputation. Peacock Staffless Brakes have proved themselves to railway engineers—they are our best boosters.

***Operators know
that Peacock
Brakes will stop
the car !***



NATIONAL BRAKE CO., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canada:—Lyman Tube & Supply Co., Ltd., Montreal

Bankers and Engineers

Ford, Bacon & Davis Incorporated Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation

Engineers—Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES

New York

Boston

Chicago

THE BEELER ORGANIZATION

ENGINEERS AND CONSULTANTS

Traction-Traffic-Equipment-Power

COORDINATION OF SERVICE—IMPROVED OPERATIONS

INCREASED TRAFFIC—FINANCIAL REPORTS

APPRAISALS—MANAGEMENT

52 Vanderbilt Ave.

New York City

SANDERSON & PORTER ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT and POWER PROPERTIES

CHICAGO

NEW YORK

SAN FRANCISCO

A. L. DRUM & COMPANY

Consulting and Constructing Engineers

VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE COMMISSIONS

CONSTRUCTION AND MANAGEMENT OF
ELECTRIC RAILWAYS

230 South Clark Street
Chicago, Ill.

215 South Broad Street
Philadelphia, Pa.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS—APPRAISALS—RATES—OPERATION—SERVICE

ENGELHARDT W. HOLST

Consulting Engineer

Appraisals, Reports, Rates, Service Investigation,
Studies on Financial and Physical Rehabilitation
Reorganization, Operation, Management

683 Atlantic Ave., Boston, Mass.

JAMES E. ALLISON & CO.

Consulting Engineers

Specializing in Utility Rate Cases and
Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.

JOE R. ONG

Consulting Transportation Engineer

Specializing in Traffic Problems and in Methods to
Improve Service and Increase
Efficiency of Operation

PIQUA, OHIO

STEVENS & WOOD, INC.

Design and Construction of Power Stations
Railroad Electrification, Industrial Plants

REPORTS AND APPRAISALS

Management and Financing of Utilities and Industrials

Mahoning Bank Bldg.
Youngstown, O.

120 Broadway
New York

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells

Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management Operation Construction

43 Cedar Street, New York City

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly Pass—Differential Fares
Ride Selling

143 Crary Ave., Mt. Vernon, N. Y.

Byllesby Engineering & Management Corporation

208 S. La Salle Street, Chicago

New York

Tacoma

Dwight P. Robinson & Company

Incorporated

Design and Construction of

Electric Railways, Shops, Power Stations

125 East 46th Street, New York

Chicago Youngstown Atlanta Philadelphia
Los Angeles Montreal Rio de Janeiro

The Most Successful Men in the Electric Railway

Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

REBUILD *with* PLYMETL

Sacramento Cal. obtains excellent results

HASKELITE engineering plywood roofs are rapidly replacing tongue-and-groove construction. They are furnished in large molded sections ready for installation. HASKELITE increases the strength of your car roof and at the same time reduces the weight approximately 200 pounds on the average double truck car.

Further reduction in weight can be made by using HASKELITE head-linings, side linings and bulkheads.



PLYMETL IS HASKELITE with steel surfaces, one side or both. It replaces sheet steel for side panels, letter boards, vestibule linings. It contributes light weight with increased strength, greater durability, easy finishing, heat insulation and sound deadening qualities.

Reduced weight lowers operating costs. Improved riding qualities and comfort are result of sound deadening and heat insulation.

The use of HASKELITE and PLYMETL in street car building is resulting in the development of a new and better type of car. The reduction in weight, with equal or increased strength, results in very appreciable operating economies. Present rolling stock can be modernized and given added years of usefulness by rebuilding with PLYMETL and HASKELITE. Send today for Blueprint booklet—it's free.

HASKELITE MANUFACTURING CORPORATION

133 W. WASHINGTON ST., CHICAGO, ILL.

*Only reliable products
can be continuously
advertised*

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.

Engineers and Contractors

SYRACUSE, N. Y.

Northern CEDAR POLES Western

We guarantee

all grades of poles; also any butt-treating specifications

BELL LUMBER COMPANY

Minneapolis, Minn.

DAY & ZIMMERMANN, INC. ENGINEERS

DESIGN - CONSTRUCTION - REPORTS
VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

Bureau of Commercial Economics, Inc. Industrial Engineers

Organization • Methods • Layout and Facilities
Public and Industrial Relations

72 West Adams Street • CHICAGO

C. B. BUCHANAN
President

W. H. PRICE, JR.
Sec'y-Treas.

JOHN F. LAYNG
Vice-President

BUCHANAN & LAYNG CORPORATION

Engineering and Management, Construction,
Financial Reports, Traffic Surveys
and Equipment Maintenance

BALTIMORE
825 Equitable Bldg.

Phone:
Hanover 5142

NEW YORK
49 Wall Street

THE P. EDWARD WISH SERVICE

50 Church St.
NEW YORK

Street Railway Inspection
DETECTIVES

131 State St.
BOSTON

HUMAN ENGINEERING

Railway Audit and Inspection Company, Inc.
Franklin Trust Building, Philadelphia

Boston
New Orleans

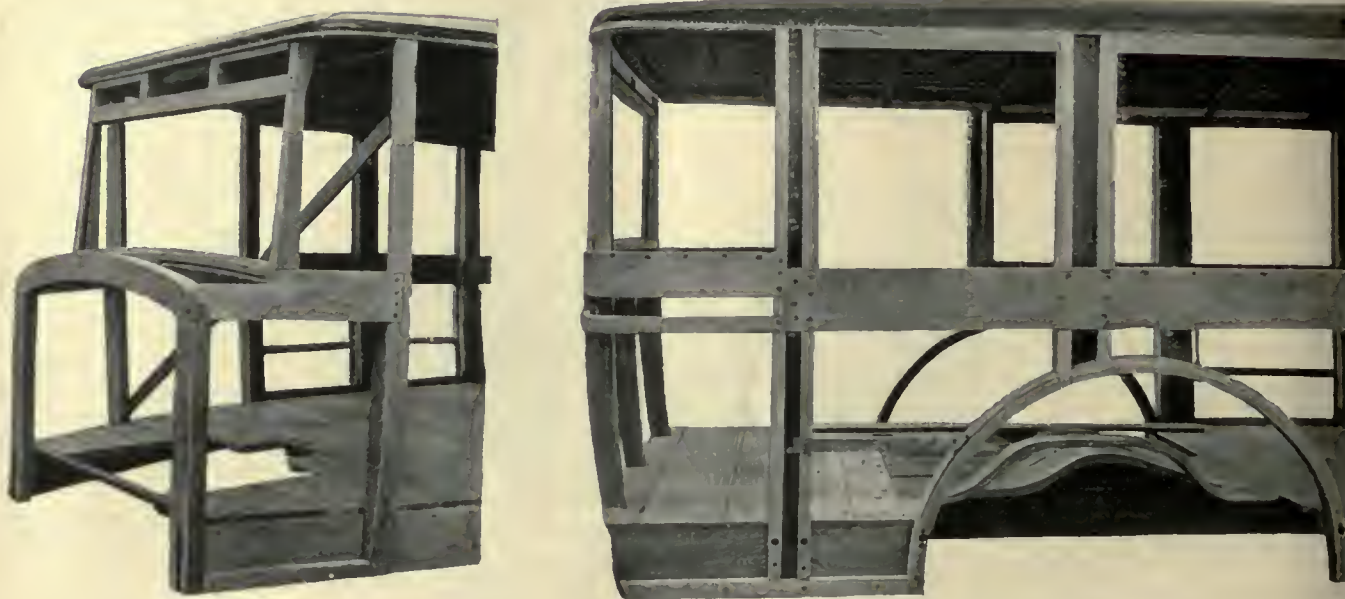
New York
Pittsburgh

BRANCHES

Baltimore
Chicago

Atlanta
St. Louis

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



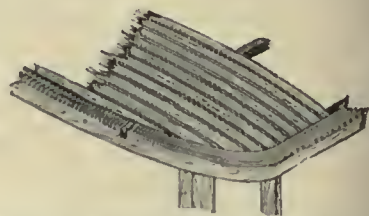
Aerostructure For Lightness Strength and Rigidity

The New Superior Bodies are a full 25% lighter due to Aerostructure. The same construction that results in big reductions in weight at the same time adds greatly to strength.

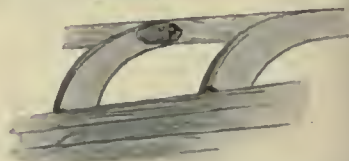
The weight reduction on these new Superior Bodies is equal to the weight of seven passengers. That means greater service and lower operating costs.

Many of the foremost chassis manufacturers have sent engineers to our plant to see these highly improved body manufacturing methods in practice. They have been thoroughly convinced of the marked advantages of Superior Aerostructure bodies.

Write for full information or send a representative to see Superior Aerostructure bodies in the making.



Above is shown the type of bend used in Superior bodies. All bends are made with laminated wood, creating a joint that in wood-working is the equivalent of a weld in metal working. These laminated bends are as strong as though the wood grew in that form for our convenience.



Above is shown the old style cross grain section formerly used. Lack of strength and clumsiness is evident. Note the irons for bracing. These are not needed with the new construction. This is one place where weight is saved.

The use of vertical sills. At the left is shown the old style construction. Note the weak way in which pillars are tied in and braced with heavy irons. At the right is shown the new vertical sill with firm anchorage for body pillars making bracing with irons unnecessary.



THE SUPERIOR MOTOR COACH BODY CO.

LIMA, OHIO

Aerostructure

**SUPERIOR
BODIES**

Coach Bodies



Six Track Bracket— on Bates Poles

The illustration shows an interesting part of the Italian State Railways' installation on Bates Poles.

Bates Poles are found in unusually severe services of all kinds, as well as in all types of standard construction. The broad usage of Bates Poles in all divisions of railway services is evidence of their suitability for such services.

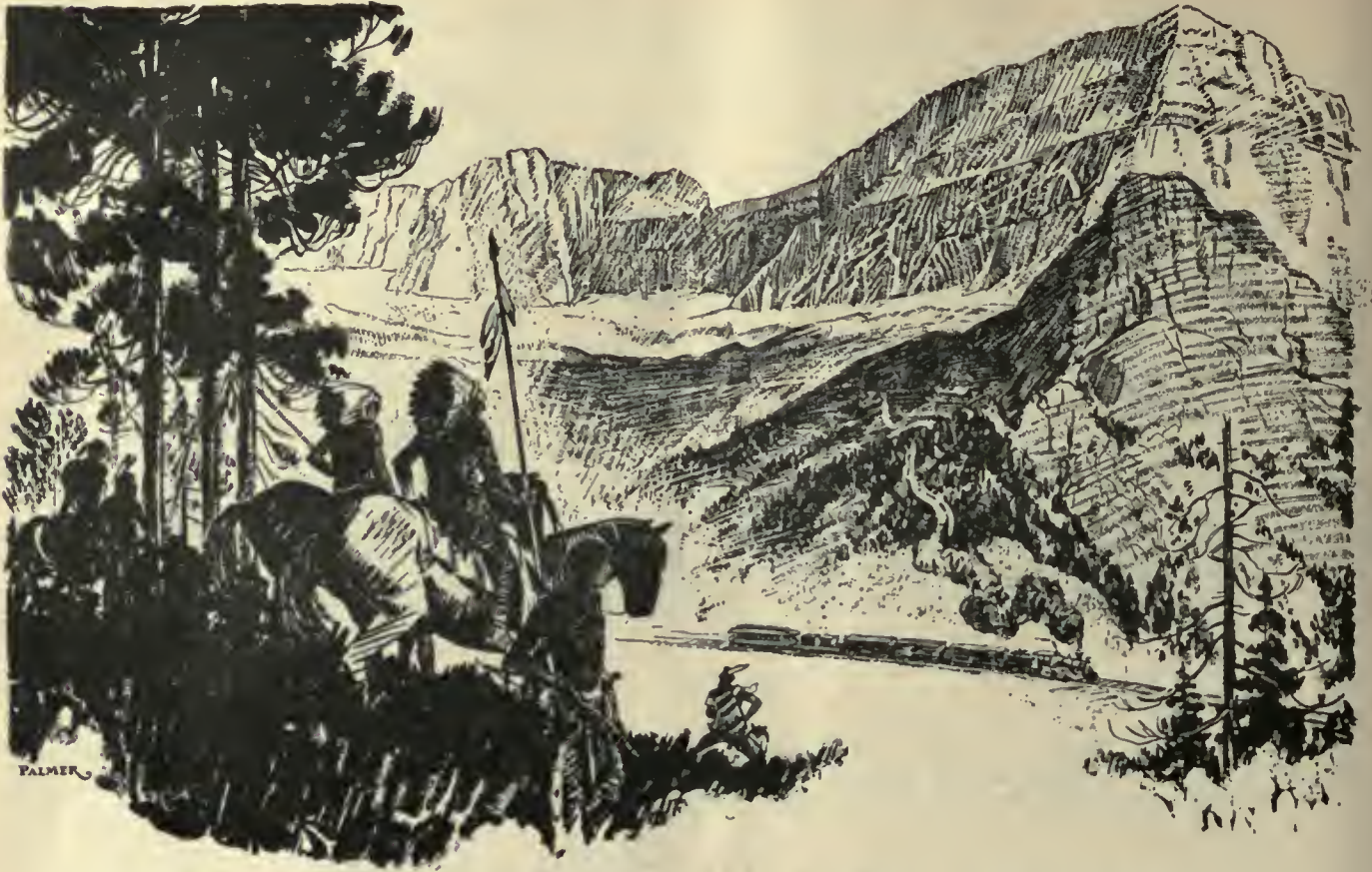
Modern, long-lived overhead construction demands steel poles that are sturdy, trim and cheaply maintained. The simplicity of Bates One Piece Steel Poles, their great strength and trim appearance, together with their surprisingly low first cost, makes these poles the logical pole for such universal adoption.

Require a Bates recommendation on all of your proposed overhead installations. Our suggestions may prove of great value to you.

Expanded Poles, Fabricated Towers or Substations—Painted or Galvanized

Bates **E**xpanded **S**teel **T**russ **C**o.

231 SOUTH LA SALLE ST., CHICAGO, ILL.



Foreseeing and Fulfilling

LIFE has always been dependent upon contact with supplies. Wandering herdsmen consumed what was close at hand and then moved on.

With the forming of fixed communities came the need for transportation. Supplies moved instead of men.

Today, with the growth of thickly populated areas, TRANSPORTATION has become the key to national prosperity.

In this country the anticipation of public needs by the railroads has produced a transportation system unequaled in any part of the world. The railroad executives have continually sensed coming conditions and built toward them. In this great work the car builders have assisted. They have earned their place as a vital supporting industry of the railroads by foreseeing as well as fulfilling the needs of the transportation experts.

But the work of looking ahead is never

completed. Today railroad executives foresee the coming need of rebuilding their steel cars. They find that the facilities necessary are far more extensive than those required for rebuilding wooden cars.

Many of them have looked into the future with profit. Three reasons have caused them to avail themselves of the facilities of the outside car-building and car-repairing establishments for this rebuilding work.

First: They deem it folly to tie up in additional shops capital much needed for transportation.

Second: They have determined that a large increase in their shop organizations for such fluctuating work would be unwise and unprofitable.

Third: They have found that the car builders and car repairers have anticipated this very need and are equipped for it, adequately.



"Foreseeing and Fulfilling" is one of a series of advertisements being published by the Railway Car Manufacturers' Association with the expectation that the facts they present will be mutually serviceable to the railways and to their supporting industries.



Its Striking Simplicity Shows Thoroughbred Parentage

PATRONAGE by the riding public is determined to a great extent by appearance.

Frills, curlicues and jig saw designs have their place on the circus wagon and in the carnival tent but when it comes to transportation, the public, in their more serious moments of travel, like the confidence inspired by simple dignified outward appearance and clean cut interiors in public conveyances.

In this simple yet attractive design is incorporated the principle of rigid construction which makes for low maintenance cost to the operator.

Each seat space is allotted a full width window permitting the passenger a wide unobstructed range of vision.

In all it presents a dignified, pleasing,

businesslike appearance which the traveler enjoys in public conveyances.

The Auto Body Company's experienced and advanced engineering ability and large modern production facilities are of vital importance to chassis manufacturers and fleet operators.

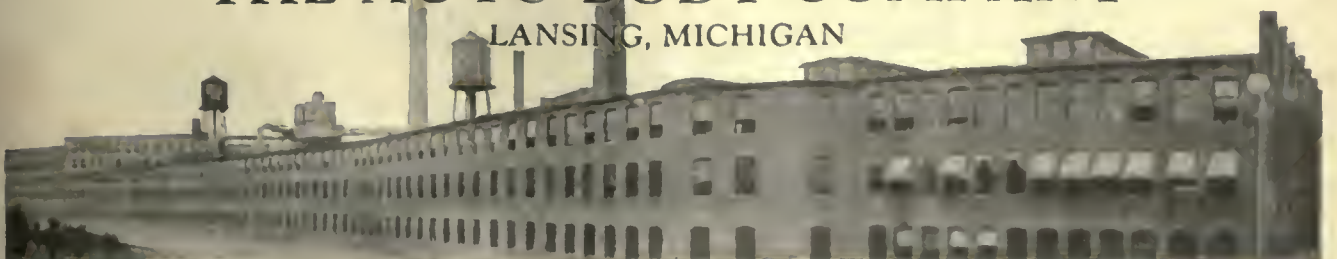


Let Auto Body Company's engineers consider your quantity Bus Body Production Problem.

Twenty-Two Years' Experience

THE AUTO BODY COMPANY

LANSING, MICHIGAN



Designers and Manufacturers of Motor Coach and Bus Bodies Open and Enclosed Automobile Bodies



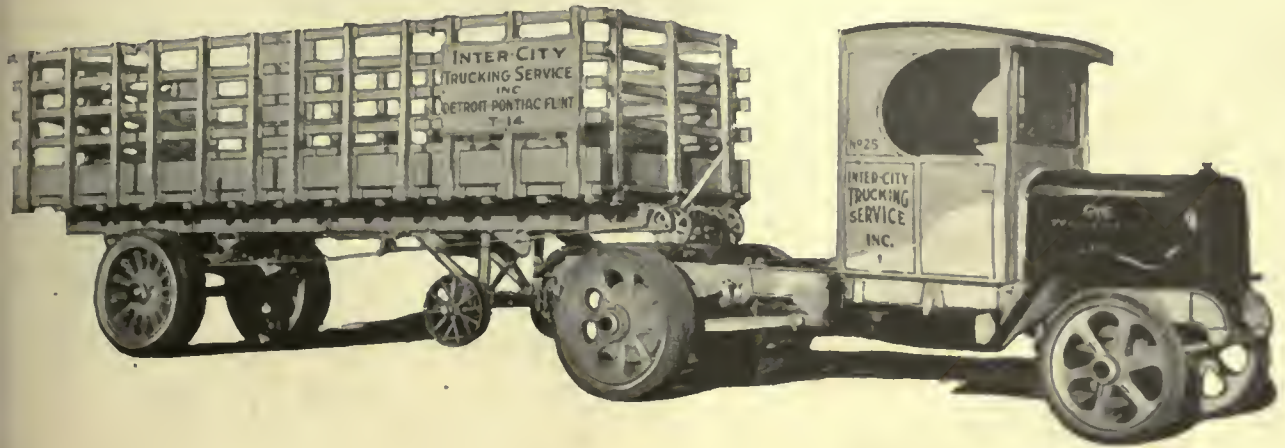
Collier Service

A nation-wide
organization
building and
sustaining car
card advertising
space values



Barron G. Collier, Inc.

Candler Bldg.
New York



Resources That Hold Leadership

Trucks lead in truck design—and it follows, naturally, that they lead in stamina—that they do better work, longer, with minimum attention.

General Motors equipment places this protection back of your truck investment; years of painstaking study to improve truck design—experience that goes back to the beginnings of the automotive industry;—constant research in metals and parts in General Motors Research Laboratories;—unequalled pumping power as a General Motors Division.

And the financial stability of a five-hundred-million dollar automotive corporation, insure the continued leadership of GMC—guarantee a continuance of the widespread action GMC performance has won.

It is suggested that you ask GMC to make a recommendation whenever you have a highway transportation problem to solve. The coupon for the GMC catalog.

General Motors Trucks



GENERAL MOTORS TRUCK COMPANY
Division of General Motors Corporation
PONTIAC, MICHIGAN

General Motors Truck Co.,
Dept. 58,
Pontiac, Mich.

Send me the GMC catalog.

Name.....

Business.....

Address.....





Monitor Edgewound Resistors are made of ribbon of zero temperature coefficient of resistivity and each convolution is individually supported at two points. On basis of air temperature permitted by the Underwriters, these units will dissipate 60 watts per inch of length.

A new principle of ventilation

H EAT is dissipated from Monitor Edgewound Resistors so evenly and uniformly that the temperature of the resistive conductor is, for all practical purposes, the same throughout.

The resistor units can be mounted side by side, on end, or on top of each other without affecting the even dissipation of heat and without overheating any part of the resistor as a whole. As a result there is no danger of a Monitor Edgewound Resistor burning out due to overheating in any section.

This unusual performance of the Monitor Edgewound Resistor is due to a new principle of ventilation plus the absence of localized heating such as occurs in resistors that change resistance with temperature. The well known "chimney effect" which causes cumulative heating, often burning out those parts in the path of the upwardly moving heated air, is eliminated.

Stronger, more compact, lighter in weight and more flexible and simple in its arrangement and construction than any resistor ever known, the Monitor Edgewound Resistor, is worthy of careful investigation. Write for Bulletin 107.



Monitor Eight-unit Edgewound Resistor with four units in parallel and two in series. Resistor tapped at two intermediate points.

The Original
"Just Press a Button"
 System



Monitor Controller Company

500 East Lombard St., Baltimore, Md.

Birmingham Boston Buffalo Chicago Cincinnati Cleveland
 New Orleans Detroit St. Louis Pittsburgh New York Philadelphia

Monitor Edgewound Resistor



Why does Detroit prefer Six Wheel Coaches?

ON OCTOBER 18, 1924, the Detroit Motor Bus Company, of Detroit, Michigan, ordered one SAFEWAY Six-Wheeler for a thirty-day trial.

Since that date this company has ordered additional equipment and deliveries have been made as follows:

November	18, 1924	. . . . .	5
"	30, 1924	. . . . .	5
December	4, 1924	. . . . .	5
"	10, 1924	. . . . .	7
"	14, 1924	. . . . .	1
"	17, 1924	. . . . .	6
January	5, 1925	. . . . .	7

WITHIN a period of less than sixty days this company has bought 37 Six Wheel vehicles. In addition to this they have contracted for 18 single deck, city type Six Wheelers.

Why is the Detroit Motor Bus Company replacing its four wheel equipment with SAFEWAY Six Wheel Coaches? The answer to this question will be found in a letter from Mr. W. F. Evans, president of the company, printed on the following page.

THE SAFEWAY SIX-WHEELER

Made by The Six Wheel Company, 1800 Lehigh Avenue, Philadelphia, Pa.



Every operator of Four Wheel Buses should read this letter

Mr. Rodney Day, President,
THE SIX-WHEEL COMPANY,
Philadelphia, Pa.

January 12, 1925.

Dear Mr. Day:

I have your inquiry relative to our experience with six-wheel Safeway buses up to the present time. Your inquiry is timely as I have just had a complete mileage record up to date, and yesterday and today have been examining the condition of tires on vehicles that have been in service between ten and eleven thousand miles each.

The entire fleet has completed just a trifle under 65,000 miles. Of the first two vehicles in service, one has completed 11,000 miles and the other one just a few hundred miles under that number.

The condition of the tires is very pleasing indeed. Mr. Deers, of the Goodyear Tire & Rubber Co., examined bus No. 601 which is the first one that went into service with me today. The tires are in most excellent condition, and it is our opinion that they will do 30,000 bus miles of service. This, of course, brings tire cost on a basis about equal to that of the solid tire.

Our study of the wear and tear would indicate that we have lengthened the life of our wooden bodies from three to four years on this chassis. Needless to say, the riding public are very much pleased with this development.

We have found the safety feature of four-wheel drive and four-wheel braking beyond comparison with any buses that we have operated so far. I guess the best evidence, after all, is that we have placed an order with your Company for an additional eighteen buses of the single-deck type.

There is now no doubt in our minds that the six-wheel bus, driving on the four rear wheels, affords opportunity for practically equally balanced load on all wheels, and makes the use of the pneumatic tire a practical and commercial proposition on vehicles of large carrying capacity.

The control of these vehicles under heavy traffic conditions has been most excellent, and we see more virtue in the engineering principles involved as the miles operated increase.

With kindest regards, I am,

Most sincerely yours,

W. F. EVANS,

President.

Detroit Motor Bus Company

WFE:FH



THE SAFEWAY SIX-WHEELER

Made by The Six Wheel Company, 1800 Lehigh Avenue, Philadelphia, Pa.



Every operator of Six Wheel coaches enjoys these advantages

THERE are certain definite advantages in the operation of SAFEWAY Coaches. They are the direct result of Six Wheel construction and are never found in any four wheel vehicle:

Better Traction—Contact with the road at six widely separated points with power applied to four rear wheels provides adequate traction even on icy streets and muddy or snow-covered roads.

More Comfort—Oscillating motion of four rear wheels absorbs road shocks and reduces passenger discomfort from road irregularities.

Greater Safety—Six point road contact practically eliminates skidding; prevents sidesway; brakes applied on all four rear wheels provide greater braking area and permit high speeds without danger.

Economy—Absorption of road shocks and vibration increases life of the vehicle from one to three years. (Silent, all-metal body with removable panels is an important SAFEWAY feature.) Distribution of load over six wheels increases tire life and makes the cost of pneumatic tires approximate that of solids.

Highway Conservation—Absorption of road shocks reduces damage to highways at least 50 per cent. (Important from standpoint of forthcoming bus legislation.)

Profits—Superior service, comfort and safety attract riders and increase revenue from each bus.

Prior to the installation of Six Wheel equipment, the Detroit Motor Bus Company had operated four wheel buses for many years. Their investigation of Six Wheel construction covered a period of almost two years and provided a fair comparison of the relative merits of the four and six wheel types of vehicle. It was on the basis of the many apparent advantages of Six Wheel construction that the first order for SAFEWAY Coaches was placed. Subsequent business has followed as these advantages proved out in actual operation.

Any operator who is considering the purchase of new equipment will be interested in the detailed account of this company's experience with SAFEWAY Six Wheel Coaches. Requests on business stationery will receive immediate attention.



THE SAFEWAY SIX-WHEELER

Made by The Six Wheel Company, 1800 Lehigh Avenue, Philadelphia, Pa.



An INTERNATIONAL Rear View
The compact sturdiness of International Coach design is apparent in this illustration. All models are built for low center of gravity, assured safety and added comfort, while maintaining sufficient road clearance.



An INTERNATIONAL Interior
More-than-pullman comfort and perfection in detail. Note the broad, silent, sliding windows; the dome lights; the comfortable upholstery, of leather or finest automobile fabrics. Ample provision for heating and ventilating.

Coaches in Four Basic Models:

54-L-1	12 to 18 passengers
54-M	18 to 22 passengers
54-H	25 to 30 passengers
54-H-1	25 to 30 passengers

Ample, dependable 6-cylinder power; 4-speed transmission; air brakes on all four wheels; long flexible springs, including auxiliary side springs; low-hung frame; interior refinements unexcelled.

Florida!

Between Tampa and the Gulf of Mexico now lies the 100-ft. Gandy Blvd., and Gandy Bridge, the great new piece of engineering spanning the waters of Tampa Bay. Florida newspapers have lately carried the information that this modern development of which southwest Florida is proud will provide the daily route for twelve De Luxe International Motor Coaches forming the "Florida Blue Line," running between Tampa and St. Petersburg.

There are many differences in operating conditions between Florida and the Dakotas, but the versatility of the line of International 6-cylinder Motor Coaches fits all needs.

The Dakotas!

The Interstate Transportation Co. is a pioneer coach line with routes operating out of Bismarck, Minot, Grand Forks, and Aberdeen. Their long experience with north-west roads has led them to Internationals. We have received this sweeping endorsement from J. G. Belanger, president of the company: "We are glad to inform you that the Interstate Transportation Co. has standardized on International Coaches for all routes in the future."

The Answer lies partly in the Four Basic Models which enable the International engineers to prescribe proper design and mechanical equipment to solve varied road and load problems. Chassis, power units, types of drive, and gear ratios are built for the individual job.

The answer lies, further, in the over-all reach of International service. International Company-owned branches, to the number of 105 in the United States, serve the interests of International Coach owners. Let us send you the International Motor Coach catalog.

INTERNATIONAL HARVESTER COMPANY

606 So. Michigan Ave.

of America
(Incorporated)

Chicago, Ill.



INTERNATIONAL 6-CYLINDER MOTOR COACHES

"INDIANAPOLIS"

Is Saving Electric Railways Millions of Dollars Annually

Don't spend a dollar on your track
(New or old)

Until you get "INDIANAPOLIS"
Prices for Comparison

"INDIANAPOLIS" **Economy Products**

"They cost less"

Solid Manganese Crossings

also Frogs, Mates, and Tongue-Switches

(15 years of specializing has produced a
product UNEXCELLED, and LOWEST in
COST, quality considered)

Electric Welders

Thoroughly Efficient

(Economical and never out of COMMISSION)

Welded Rail Joints

(A COMBINATION OF EVERY ESSENTIAL
FACTOR in Rail Joining and Bonding)

Welding Steel Electrodes

Absolutely Dependable

Electric Welding Supplies

Hoods, Lenses, Carbons, Etc.

Better design

Higher quality

Longer service

Lower prices

The Indianapolis Switch & Frog Co.

SPRINGFIELD, OHIO

Los Angeles

San Francisco

Kansas City

Boston



Chilled Iron Wheels

possess the required factors of safety at the lowest cost.

The hard wearing surface of the tread has sufficient bearing power to carry the maximum load of any car yet designed without permanent deformation, and has the maximum resistance to abrasion.

The hard tread and flange have a maximum wearing value.

The wearing surface of the tread and flange causes the least abrasion of the rail and offers the least resistance to rolling. There is a consequent saving in rail replacement cost and fuel consumption.

The metal of the tread produces the greatest co-efficient of brake shoe friction, yet removes the least quantity of brake shoe metal. Braking efficiency insured with decrease in brake shoe consumption over other types of wheels.

They carry a service guarantee

Cost Less Per Car Mile

**ASSOCIATION OF MANUFACTURERS
OF CHILLED CAR WHEELS**
1847 McCormick Building
CHICAGO

50 PLANTS ~ DAILY CAPACITIES 20000 WHEELS

Ten Years of Service has proved

Rex METAL Sash

and Weatherstrip

to be practical, rugged, modern and economical

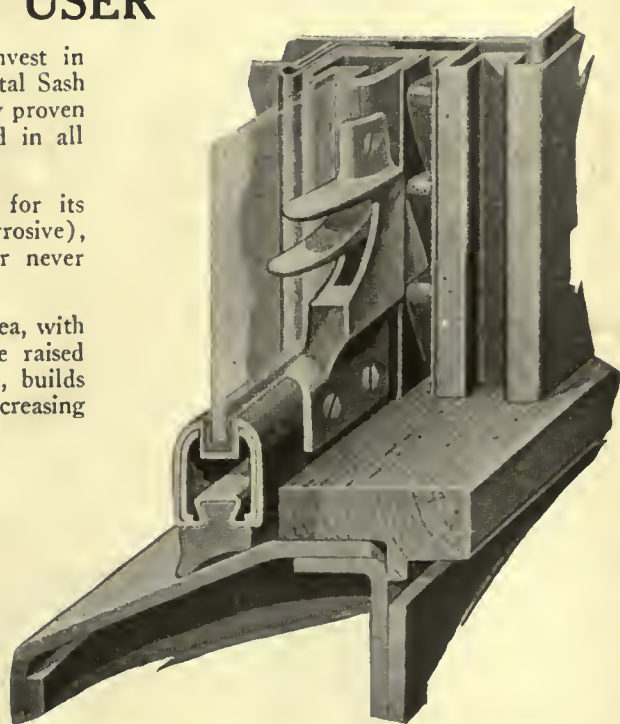
ASK THE USER

Today's service requirements demand that every cent you invest in equipment should be wisely spent. The superiority of Rex Metal Sash and Weatherstrip, over ordinary wood sash, has been undeniably proven for electric traction service under all conditions of traffic and in all climates. **ASK THE USER.**

Strict modern specifications should include Rex Metal Sash for its great saving in maintenance. Rex Sash, being all metal (non-corrosive), does not swell, warp or crack—needs no re-painting. A car never goes to the shop for Sash repairs when Rex equipped.

There is the fireproof feature to consider and the greater light area, with Rex. Passengers appreciate the ease with which windows are raised and lowered. It is well known that the car, better equipped, builds revenue—Rex Sash does its share, to a profitable degree, in increasing revenue. **ASK THE USER.**

Electric traction companies and Car Builders appreciate Rex economy and service value. Why not get details?



Some prominent users of Rex equipment

Baltimore & Ohio R. R. Co.
Boston Elevated
Chicago, Burlington & Quincy R. R.

Chicago, North Shore & Milwaukee R. R.
Chicago Rapid Transit Co.
Cleveland Railway

Indiana Service Corp.
Metropolitan Street Ry. Co.
New Orleans Public Service

New York Municipal Railway
Northern Ohio Traction Lines
Pacific Electric Co.

The Curtain Supply Company

Factory, Elkhart, Ind.

CHICAGO
355 W. Ontario St.

NEW YORK
50 Church St.



The Perfect Track

Carnegie Steel Cross Ties

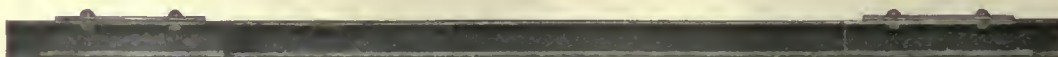
should be included as an essential item in your track maintenance program, as the use of steel cross ties is an essential item toward the attainment of the perfect track—the safe, repair-free track.

The tie shown below is a popular new fabricated section for use as a joint or intermediate tie. The standard I-beam section is used in its construction.

Extensive and modern facilities permit us to serve you promptly and efficiently.



*Special Fabricated Tie
for use as a Joint or
Intermediate Tie*



CARNEGIE STEEL COMPANY

General Offices • Carnegie Building • 434 Fifth Avenue

PITTSBURGH

PENNSYLVANIA





Tune in on the **DOOR ENGINE**
talk from Station **CCH**

This is station CCH, the Consolidated Car Heating Company, broadcasting its weekly program to the electric railway industry, direct from its factory at Albany.

The Message is Door Engines—

CONSOLIDATED Engineers have worked out many improved features in complete pneumatic door-operating equipment for folding and sliding doors and steps.

Some of these features are:

1. The triple-safety principle—a cushion bumper on the door, a collapsing door operating arm and an engine by-pass valve which prevents building up a harmful pressure. With these features at work, it is impossible to injure the passenger.
2. Door engine cylinders are ground and honed to a high finish, which prevents wear on piston levers.
3. Ball bearing rollers on door hangings and door operating arm.
4. Bronze bushings and machine cut gears and racks, assuring long-life and smooth operation.
5. Door engines are interchangeable for right or left.

Station CCH now signing off until next week, when it will resume broadcasting with another weekly message.

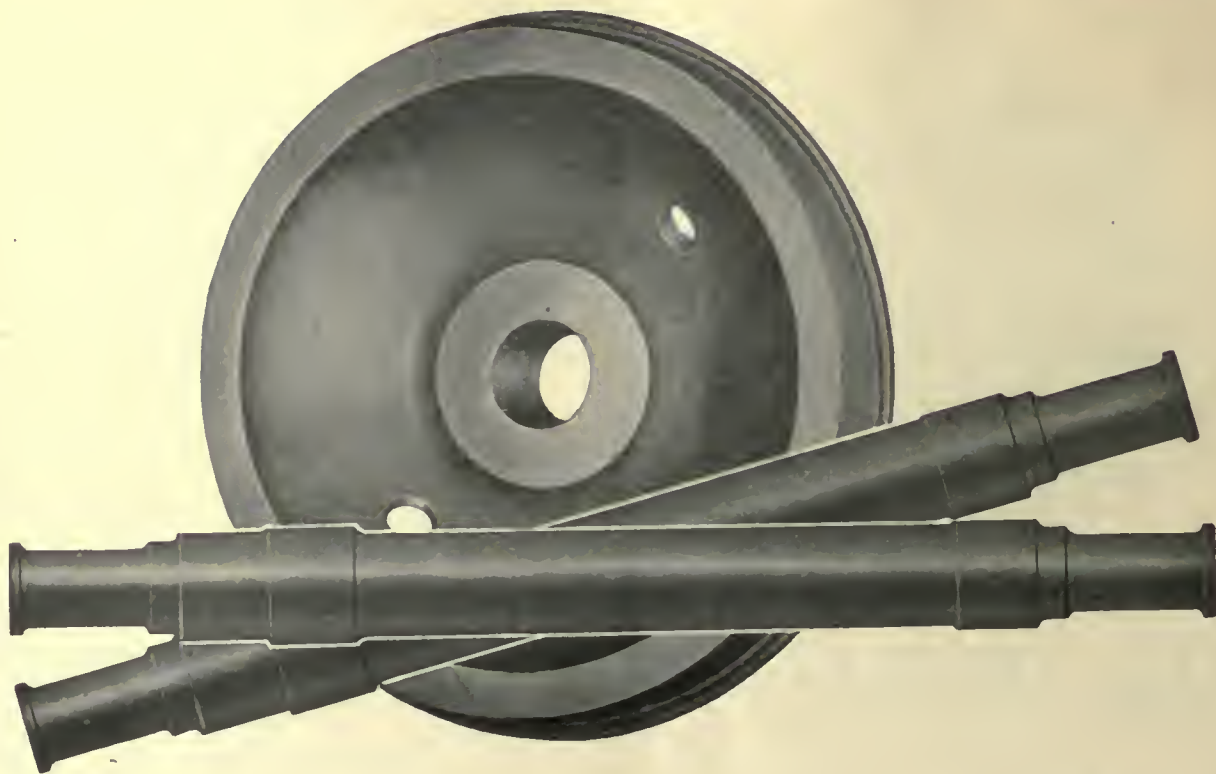
Good day!



CONSOLIDATED CAR HEATING COMPANY
ALBANY, N. Y.

New York

Chicago



Cambria Rolled Steel Car Wheels and Forged Axles

CAMBRIA ROLLED STEEL CAR WHEELS for Electric Service are made at the Johnstown Plant of Bethlehem Steel Company by a combination rolling and forging process. This process thoroughly works the steel and gives an exceptional refinement in structure which does not readily develop flat spots. For this reason Cambria Rolled Steel Car Wheels will give you the longest service at lowest cost.

CAMBRIA FORGED AXLES for Street, Interurban, Subway and Elevated cars, and Armature Shafts for Electric Service are made to meet any reasonable specification. They can be furnished treated or untreated; solid or hollow bored; smooth forged only; rough turned all over; rough turned on journals and wheel seats; or finished turned on journals and wheel seats.

We will also mount wheels on the axles if so desired.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Sales Offices

New York
Boston
Philadelphia

Baltimore
Washington
Atlanta

Buffalo
Pittsburgh
Cleveland
San Francisco

Detroit
Chicago
Cincinnati

St. Louis

Bethlehem Steel Export Corporation, 25 Broadway, New York City
Sole Exporter of Our Commercial Products

We have a large stock of wheels in standard sizes and can supply on short notice:

Wheels for City and Suburban Service from 21 to 36 inches diameter with rims $3\frac{1}{2}$ inches to $4\frac{1}{4}$ inches wide and $1\frac{1}{2}$ to $2\frac{1}{2}$ inches thick.

Wheels for Interurban Service from 22 to 37 inches diameter with rims $3\frac{1}{2}$ inches to $4\frac{1}{4}$ inches wide and $1\frac{1}{2}$ to 3 inches thick.

BETHLEHEM

NON-ROT SHELTERS



& NON-ROT
PLATFORMS
built of

Tide Water
Cypress
"The Wood Eternal"

are a very
valuable
contribution toward
Economy
Records.

Economy Records figured over a period of years gain more by the *avoidance of repairs and replacements* than they can by any minor shaving of the original cost. True "*Tide-water*" Cypress, the only "*Wood Eternal*," is coming into its own as the ideal light structural lumber for *Railway Uses.*

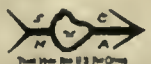
We recommend Cypress only for the applications in which it excels.

WRITE FOR INFORMATION

Southern Cypress Mfrs. Ass'n

1265 Poydree Bldg.
New Orleans, La.

1265 Graham Bldg.
Jacksonville, Fla.



Identify "*Tide-water*" Cypress
by the Arrow Trade-Mark.



SLEET CUTTING DEVICES



Nuttall Sleet Wheels replace the standard trolley wheels and efficiently clean sleet coated wires.



Nuttall Sleet Scrapers hook over the trolley wheel — can be attached instantly, and clean the wire thoroughly. Don't wait for a sleet storm — order today.

R.D. NUTTALL COMPANY
PITTSBURGH  PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

How successful companies accelerate traffic movement—
How electric railways are using the motor bus—
The selection and training of railway men—

The new second edition of Blake and Jackson's Electric Railway Transportation, covers the above phases of modern electric railway transportation thoroughly. In addition it gives the most valuable kind of information on handling traffic difficulties making and maintaining schedules—collecting fares—securing the proper public relations—using the motor bus as a supplementary service—meeting outside bus competition—trackless trolleys—keeping the working force efficient—and hundreds of other important electric railway points.

Blake and Jackson's
Electric Railway Transportation
New, thoroughly revised, second edition

By HENRY W. BLAKE, Editor, Electric Railway Journal.
AND WALTER JACKSON, formerly Associate Editor, Electric Railway Journal.

437 pages, 6x9, 121 illustrations, \$5.00 net, postpaid

The latest development in successful practice

This second edition is practically a new book. The material has been brought right down to present-day practice. Much new valuable material is added.

The Chapter Headings are:

I.—Organization and Definitions. II.—Adjustment of Traffic to Service. III.—Accelerating Traffic Movement Along the Line. IV.—Accelerating Traffic Movement on the Car. V.—Car Types in Relation to Traffic. VI.—City Timetables—Preliminaries. VII.—Interurban Schedules and Dispatching. VIII.—Fares. IX.—Fare Collection Practices and Devices. X.—Public Relations. XI.—Promotion of Passenger Traffic. XII.—Traffic Signs for Cars, Station and Road. XIII.—Motor-Bus Operation by Electric Railways. XIV.—Selection and Training of Men. XV.—Wages and Wage Agreements. XVI.—Employee Relations. XVII.—Discipline of Trainsmen. XVIII.—Forms of Extra Pay.

See and use a copy of this new book for 10 days FREE

You will obligate yourself in no way, except to examine and decide whether the book is not worth many times its small price.

A helpful book



See it for 10 days FREE

McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York.

You may send me on 10 days' approval Blake and Jackson's Electric Railway Transportation, \$5.00, net, postpaid. I agree to remit for the book or to return it postpaid within 10 days of receipt.

Signed

Address

Official Position

Name of Company

(Books sent on approval to retail purchasers in U. S. and Canada only.) E. 2-7-25



Super Service throughout Hudson River Vehicular Tunnel

From the lead in cables to the lighting cables in the compression tubes, the rubber insulated conductors, bear the Rome "Super Service" mark.

For a period of two years this cable has been used for portable leads in connection with the construction of this 9,250 foot tunnel under the Hudson River—a passageway between New York City and Jersey City that will accommodate 46,000 vehicles a day.

Super Service was selected by Booth & Flinn, Limited, contractors, because it is a cable built to withstand rough usage—made so, proved so by actual service in tunnels and in hundreds of mines.

Unlike other cable, "Super Service" has a double jacket of 60% rubber, which is vulcanized in steel molds under tons of pressure. It is waterproof and resistant to oil, acids, and other destructive elements.

Considering these facts, is there any wonder that Rome "Super Service" meets the test of the toughest kind of usage?

Write for samples and further facts

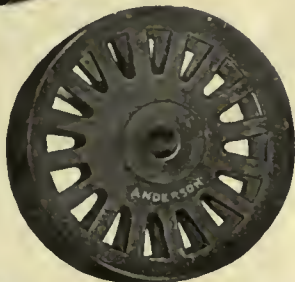
ROME WIRE CO. Mills and Executive Offices ROME, N. Y.;
Diamond Mills: BUFFALO, N. Y.

BRANCHES:
NEW YORK BOSTON DETROIT CLEVELAND CHICAGO
50 Church St. Little Bldg. 25 Parsons St. 1200 W. 9th St. 14 E. Jackson Blvd.
LOS ANGELES, J. G. Pomeroy, Inc., 336 Azusa Street.
SAN FRANCISCO, J. G. Pomeroy, Inc., 611 Howard St.

ROME WIRE
WIRE-ROME



Sleet Cutter
Cat. No. 18847



Sleet Wheel
Cat. No. 18848

TRADE



MARK

Immediate Shipment on Sleet Cutters and Wheels

Wire or telephone your orders and we will ship immediately any reasonable quantity of Sleet Cutters or Wheels you may want, direct from stock.

Prompt as such shipments are, actual delivery takes time and a wire or telephone call, now, may save you hundreds of dollars in delays and repairs later on.

Sleet weather is going to be a long while with us yet.

289-305 A St., Boston, Mass.

New York—135 Broadway
Chicago—105 South Dearborn St.

Philadelphia—429 Real Estate Trust Bldg.
London, E. C. 2—12 Moor Lane

An invaluable instrument on every railway

THE WESTON MODEL 280 VOLTMETER



Model 280 Triple-Range Voltmeter

THE Testing Department, the Signal Engineer and the Line Department will welcome the acquisition of this instrument. It has the same dependability found in the larger, more expensive Weston Instruments.

When you need Electrical Testing Instruments, think of Weston, they are the recognized standard the world over.

Altogether several million users throughout the world have purchased Weston Instruments, exclusive of the Radio field. These millions have purchased Weston Instruments because they know by experience they get the highest degree of accuracy and continuous service from them.

For the railroad that operates a fleet of Motor Buses, there is a Weston Instrument for every phase of automotive testing.

Circular "H" describes our automotive instruments and Bulletin 501 covers the Model 280 Miniature Precision Instruments. They will be sent gladly on request.

WESTON ELECTRICAL INSTRUMENT CORP.
18 Weston Avenue, Newark, N. J.
Offices in All Principal Cities

WESTON

Electrical Indicating Instrument Authorities Since 1888

STANDARD The World Over



Rail Joints Need Not Be a Source of Trouble

But many track troubles may be traced to them. Much of the upkeep of rolling stock also. Battered and sunken joints do incalculable damage to cars, not to mention the discomfort to passengers they cause.

The Dayton Resilient Joint Tie supports both rails on

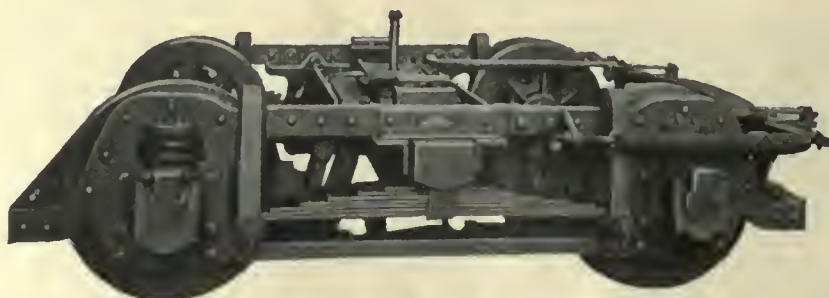
the same level and abolishes all joint troubles. Where they are used, battered and sunken rail joints are unknown.

Welding the rail to the top of the tie provides excellent current return. No other bonding required. Investigate!

The Dayton Mechanical Tie Co., 707 Commercial Building, Dayton, Ohio

DAYTON *Resilient* TIE

Simplicity, Strength and Perfect Riding Qualities Characterize Baldwin Electric Motor Trucks



Baldwin Motor Truck, Class "R," with "Inside Hung" Motors

ON a number of the electric railways in Japan, both in city and suburban service, Baldwin Improved Electric Motor Trucks have given the most satisfactory results. We will forward any information desired for trucks to meet your requirements.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U. S. A.

Cable Address, "Baldwin, Philadelphia"



Type OB-4 Governor

Type OB-4 Governor for Air Brake Equipment

The dependability of this governor has led to its adoption by railways and other users of air compressors.

Send for Bulletin 1091

ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
Steam Engines
Gas and Oil Engines
Hydraulic Turbines
Crushing and Cement Machinery
Mining Machinery

ALLIS-CHALMERS
MANUFACTURING COMPANY

MILWAUKEE, WISCONSIN. U.S.A.

ALLIS-CHALMERS PRODUCTS
Flour and Saw Mill Machinery
Power Transmission Machinery
Pumping Engines-Centrifugal Pumps
Steam and Electric Hoists
Air Compressors - Air Brakes
Agricultural Machinery
Condensers

Study the advantages of this transfer

The Community Traction Co.		THIS TRANSFER IS ISSUED AND ACCEPTED SUBJECT TO CONDITIONS ON REVERSE SIDE	
C-K		019670	
GOOD INBOUND ONLY		INBOUND SPECIAL FREE TRANSFER	
FROM BUS OR TRIPPER TRANSFERRING TO LINE PUNCHED			
3 AM	6 AM	9 AM	12 NOON
7 AM	8 AM	11 AM	
LINE			
ADAMS			
BAY			
BAY			
CHERRY			
DOOR			
E BAY			
FRONT			
INDIANA			
LACROIX			
LONG B			
MICH			
MONROE			
NEBRASKA			
N ERIC			
OAK			
SHORT B			
SOUTH			
STARK			
STICKNEY			
SUMMIT			
WESTERN			

The Time Limit Feature

1. No Punching.
2. Expired limit detected by length of ticket.
3. No possibility of confusing A.M. and P.M. as contrasting colors are used.

The Date Feature

1. No punching or notching.
2. Indicated by letters and figures, varied at pleasure.
3. No wasted transfers.

If you want to ask questions or wish samples, you're perfectly welcome

Globe Ticket Company 116 N. 12th St. Philadelphia, Pa.
Specialists in Tickets and Checks Since 1873 Los Angeles New York San Francisco

Standardize on Transformer Protection



Another way to save money is to standardize on transformer fence. It's easier to buy it and install it—you're more certain of a correct, practical job.

PAGE has developed many specially designed transformer enclosures with numerous advantages, such as removable panels that fit in concrete set sleeves (cheaper than wide gates) to facilitate removal of tanks—standard panels and fittings to surround surge arresters.

The illustration shows one of several such installations for the Detroit Edison Co. Note the special removable panels, and standard panels protecting surge arresters inside.

PAGE offers you the benefit of wide experience in developing protection for electrical property—its co-operation with your engineers to develop just what you want. You may find what you need in *Standard PAGE Equipment*. Write for name of Distributor near you who carries a complete stock, and for the illustrated PAGE Fence Book showing typical electrical installations. No obligation—address



*America's
first wire
fence—1882*

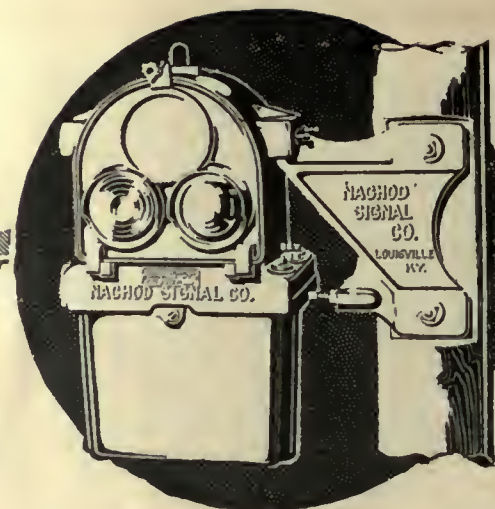
The Page Fence & Wire

Products Ass'n.

213G. N. Michigan Ave.
Chicago, Ill.

Distributing wire link products made by the Page Steel & Wire Company, of Bridgeport (District Offices in San Francisco, Pittsburgh, New York and Chicago). An associate company of the American Chain Company of Bridgeport.

PAGE PROTECTION FENCE



Keep Your Cars Moving

The manager speaks: "The main thing about operating street cars, and especially on single track lines, is to keep the cars moving and not have them waste a lot of time on switches waiting for meets. This, more than anything else, exasperates and drives away passengers."

Verily, the car on the switch gathers no dividends.

Nachod Signals are invaluable with

Safety Cars

to maintain the short headways that invite the public to ride. Nachod Signals tell the motorman when the block is clear to the next passing siding. Show him when he takes the block that he has stopped an opposing movement. Permit other cars to follow him thru the block, notifying them that the block is occupied and giving each an indication of protection in entering; meanwhile holding stop signals at the other end until the block is again clear.

NACHOD SIGNALS

protect all shifting moves automatically, permitting city and interurban cars to change order at a siding.

They save time by eliminating a stop, since they work at any speed. They operate from overhead contactors at any feasible line voltage and give duplicate indications of lights and disks that cannot be mistaken under any lighting conditions.

Catalog 719 describes Nachod Signals. Write for it.

Nachod Signal Co., Inc., Louisville, Ky.
Manufacturers of Automatic Signals, Highway Crossing Bells and Automatic Headway Recorders.

NACHOD SPELLS SAFETY



These attractive one-man, double-truck safety cars were delivered to the Helena (Mont.) Light & Railway Co.

*Another lot
built by the*

PERLEY A. THOMAS CAR WORKS

High Point, N. C.

“THOMAS-BUILT” cars are going far and wide in ever-increasing numbers.

Why do distant traction companies come to High Point, North Carolina, for new cars? Because “Thomas-built” cars are built with an individual care and attention to details which insures attractive finish throughout and a long life of satisfactory service. Furthermore Perley A. Thomas’ prices and quick deliveries appeal to the railway field.

Let us quote on your new cars.

R. H.

TAYLOR REDUCED HEIGHT TRUCK

S. WITH A.

TAYLOR STRAIGHT ACTION BRAKE



SMOOTH RIDING
LOW MAINTENANCE COST—Absolute Safety

Center Plate Height 22 $\frac{3}{4}$ in. with 26 in. Dism. Wheels

For Modern Low Level Double Truck Cars, the Taylor R. H. Truck, equipped with Taylor S. A. Brake, with large diameter hard steel pins, will provide the best possible service results from every standpoint.

TAYLOR ELECTRIC TRUCK CO., TROY, N. Y.

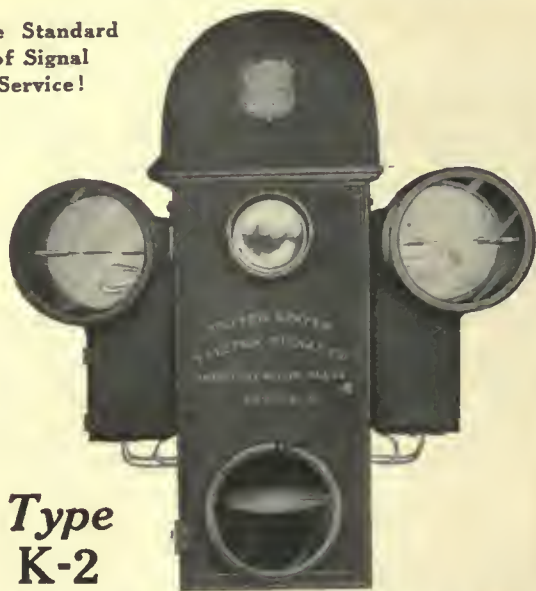
SPECIFICATIONS ON REQUEST

Established 1892

SEND FOR PORTFOLIO

U. S. ELECTRIC SIGNALS

The Standard
of Signal
Service!



**Type
K-2**

**Most adaptable and reliable signal
for electric railway requirements**

Widely used by leading companies for single track operation, to promote safe, speedy, and uniform schedules. Adapted to meet all requirements. Semaphore and light indications for day and night. Positively fixed, individual proceed aspects, indi-

cate counting of fifteen following cars into block, giving unmistakable evidence of protection in Type K-2 duplicate lamps cut in automatically in case of burn-outs. Neutral aspects (i.e., no indications) when block is uncoupled.

**UNITED STATES ELECTRIC SIGNAL CO.
WEST NEWTON, MASS.**

REPRESENTATIVES:
Western: Frank F. Bodier, Monadnock Bldg., San Francisco, Calif.
Foreign: Forest City Electric Service Supply Co., Manchester, England.

DUNDEE "A" AND "B" FRICTION TAPES



are
Okonite
Products

'Nuff Said!

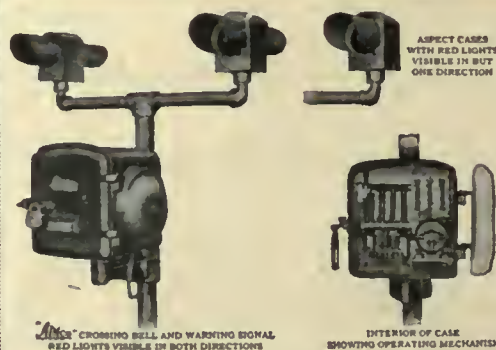


Write for Samples and Circulars

THE OKONITE CO., Passaic, N. J.

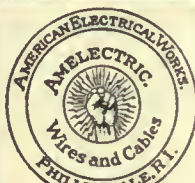
Incorporated 1884

SALES OFFICES: New York Chicago Pittsburgh St. Louis
Atlanta Birmingham San Francisco
F. D. Lawrence Electric Co., Cincinnati, O.; Novelty Electric Co., Philadelphia, Pa.; Pettingel-Andrews Co., Boston, Mass.
Canadian Representatives: Engineering Materials Limited, Montreal



Send
Today
for our new
Publication on
Safety
and
Efficiency
in Electric
Railway
Signals and
Crossing
Bells

AMERICAN INSULATING MACHINERY CO., INC.
521 Huntingdon St., Philadelphia, Pa.



Reg. U. S. Pat. Office

Incandescent Lamp Cord

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

**WEATHERPROOF WIRE
AND CABLE**

**PAPER INSULATED
UNDERGROUND CABLE**

MAGNET WIRE

**AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.**

Boston, 116 Federal; Chicago, 113 W. Adams;
Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

ELRECO TUBULAR POLES



THE "WIRE LOCK"

THE CHAMFERED JOINT

COMBINE

Lowest Cost

Least Maintenance

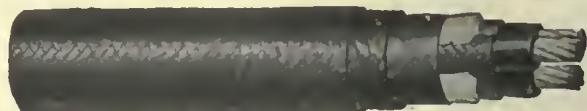
Lightest Weight

Greatest Adaptability

Catalog complete with engineering data sent on request.

**ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO**

New York City, 30 Church Street



Standard Underground Cable Co.

BOSTON PHILADELPHIA PITTSBURGH DETROIT
NEW YORK WASHINGTON CHICAGO ST. LOUIS SAN FRANCISCO

ROEBLING

WELDING CABLE

ELECTRICAL WIRES and CABLES

John A. Roebling's Sons Company, Trenton, N. J.

Shaw Lightning Arresters

*Standard in the Electric Industries
for 35 years*

Henry M. Shaw

150 Coit St., Irvington, Newark, N. J.

**Chapman
Automatic Signals**

Charles N. Wood Co., Boston



American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

*Send for new
Rail Bond Book*

**American Steel & Wire
Company**
CHICAGO
NEW YORK



*Time is the great test.
The most efficient and
permanent insulation
known is*

KERITE

KERITE INSULATED WIRE & CABLE COMPANY
NEW YORK CHICAGO

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of
Water Tube Boilers
of continuing reliability

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, Ariz., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building



WORKS

Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

ANACONDA TROLLEY WIRE

ANACONDA COPPER MINING COMPANY
Conway Building, Chicago, Ill.
THE AMERICAN BRASS COMPANY
General Offices, Waterbury, Conn.

HUBBARD TURNBUCKLES

Made in three
types, Eye and Eye,
Eye and Hook and
Eye and Clevis.



Double-Dip Hat
Galvanized the
Hubbard Way.

Type B, Eye and Hook

HUBBARD & COMPANY
PITTSBURGH CHICAGO

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

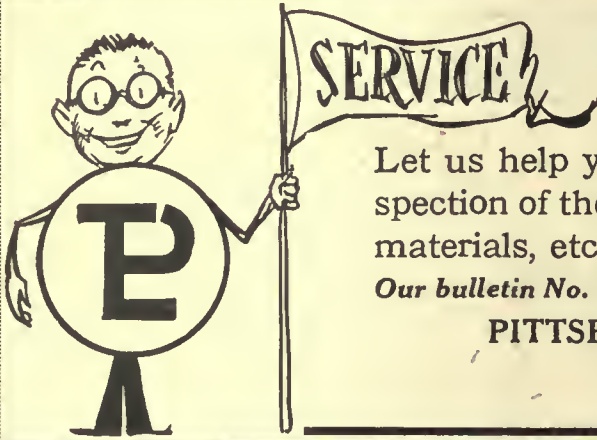
Cameron Electrical Mfg. Co., Ansonia, Connecticut



ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed.
Up-to-date and economical.

Alumino-Thermic Corp., Roselle Park, N. J.



Service is P. T. L.'s STANDARD

Let us help you maintain yours by progressive inspection of the cars, rails, track fastenings, creosoted materials, etc. you buy.

Our bulletin No. 28 tells how we do it—shall we send you a copy?

PITTSBURGH TESTING LABORATORY

Inspection Engineers and Chemists

PITTSBURGH, PENNA.

Branch Offices in the Principal Cities

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa.

Sales Offices:

Atlanta Chicago Cleveland New York
Philadelphia Pittsburgh

Pacific Coast Representative:

Los Angeles United States Steel Products Company
Portland San Francisco Seattle

Export Representative:

United States Steel Products Company, New York, N. Y.

BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.

Established 1858

Manufacturers of

Special Work for Street Railways

Frogs, Crossings, Switches and Mates

Turnouts and Cross Connections

Kerwin Portable Crossovers

Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

THE WORLD'S STANDARD "IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.

Irvington, N. J.

Sales Representatives in the Principal Cities

GODWIN Steel Paving Guards

*Adapted to all
types of rails
and paving*



Proven by service
to economically
prevent seepage
and disintegration
of street railway
paving.

Write for Illustrated Catalog No. 20.

W. S. GODWIN CO., Inc.
RACE & McCOMAS STS., BALTIMORE, MD.

NEW and RELAYING RAILS

1 TON OR 1000

TRACK
EQUIP-
MENT

L.B. FOSTER CO.

RAIL
ACCESS-
ORIES

PITTSBURGH - PENNSYLVANIA

NEW YORK - JERSEY CITY - PHILADELPHIA - HAMILTON, O.

HORNE & EBLING CORPORATION

50 CHURCH ST.,

NEW YORK, N. Y.

Brass Hardware
For Cars and Buses

Sterling Trolley Bases
and Brakes

Motor and Controller
Parts

Mall. Iron and Brass
Castings



OXYGEN, ACETYLENE, HYDROGEN for cutting, welding, etc.

Quick shipment and low prices also on cylinders, valves,
torches, regulators and supplies.

INTERNATIONAL OXYGEN COMPANY

Branch Offices: New York Pittsburgh Toledo
Main Offices: Newark, N. J.

BRAZED Rail Bonds ARC WELD
Portable Arc Welding Outfits
The Electric Railway Improvement Co.
Cleveland, Ohio

PERFECT MICANITE INSULATOR

Reg. U. S. Pat. Off.

ELECTRICAL INSULATION

Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

Catalogs will gladly be furnished

MICA INSULATOR COMPANY

Sole Manufacturers of Micanite

Established 1893

66 Church St., New York 542 So. Dearborn St., Chicago
Works: Schenectady, N. Y.

8-F



N-L Type "AA"
Bus Ventilator

"Superior Ventilation"

Perfect ventilation of cars and buses pays—in cold, cash profits. In cold weather, passengers like warm air—if it is fresh. But next to bad air, they dislike drafts.

N-L Ventilators give a complete change of air many times an hour, without drafts. No snow, rain or dust can get in. Now used by leading street railways and bus body builders.



"Superior Ventilation" describes them fully. Write for a copy.

The Nichols-Lintern Co.

7960 Lorain Ave. Cleveland, Ohio
Canadian Representative: Railway & Power Eng. Corp., Ltd.,
133 Easter Ave., Toronto

B. A. HEGEMAN, Jr., President C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions	Economy Electric Devices
Bell Locked Fare Box and Change Maker	Co.'s Power Saving and Inspection Meters
The Aluminum Field Coils	Anglo-American Varnish Co., Varnishes, Enamels, etc.
Walter Tractor Snow Plows	Gilmer Multiple Safety Step Treads
Cutler-Hammer Electric Heaters	National Hand Holds
Pittsburgh Forge & Iron Co.'s Products	Ft. Pitt Spring & Mfg. Co., Springs
Genesco Paint Oils	Turnstile Car Corporation's Turnstiles
E. Z. Car Control Corporation's Safety Devices	Anderson Slack Adjusters
Garland Ventilators	Feasible Drop Brake Staffs
Flaxium Insulation	Dunham Hopper Door Device
Yellow Coach Mfg. Co.'s Single and Double Deck Buses	



Use only Awebco Tape on your Armatures
Field Coils have better protection when wound with
"AWEBCO Tape." Send for samples.

ANCHOR WEBBING COMPANY

300 Brook Street, Pawtucket, Rhode Island

"Longwear" Pins and Bushings

Hard—Accurate—Uniform



Renewal Materials
for Peckham and
other Trucks

Castings—Forgings
Springs

E. G. Long Company

50 Church Street, New York, N. Y.

HIGH SPEED CHANGE CARRIERS

1925 model
—without
rivets—
ready for
delivery



Supplied in
one or four
tube combinations

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them.

Prices and Literature sent on request

J. L. GALEF, 75 Chambers St., N. Y. C.
Exclusive Manufacturer's Selling Agent



Double Register

Both our latest single and double registers are now equipped for electric as well as mechanical hand or foot operation.

Full Electric Operation of Fare Registers

A completely satisfactory fare registration system is one that has the confidence of the public, the conductor and the accounting department. The simplicity and accuracy of International Registers maintained for more than thirty years, is combined in the later types with the extra speed and convenience of electric operation.

The International Register Co.

15 South Throop St., Chicago

Exclusive Selling Agents for HEEREN Enamel Badges



Coin Quality TOKENS

UNIFORM BUTTONS
CONDENSER TUBING

Main Office, Mills and Factories
WATERBURY, CONN.

New York

Chicago

San Francisco

Boston

Cleveland

Atlanta

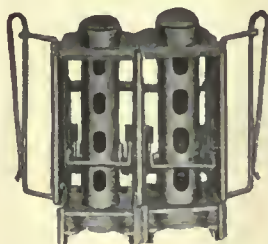
Philadelphia

Los Angeles

ESTABLISHED 1802
SCOVILL
MANUFACTURING COMPANY

MEMBER COPPER AND BRASS RESEARCH ASS'N

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

Play for safety—

*plus resiliency—
plus long life*

By specifying

FORT PITT SPRINGS

FORT PITT SPRING &
MFG. CO.
Pittsburgh, Pa.



Gets Every Fare
**PEREY TURNSTILES
or PASSIMETERS**

Use them in your Prepayment Areas and
Street Cars

Perey Manufacturing Co., Inc.
101 Park Avenue, New York City

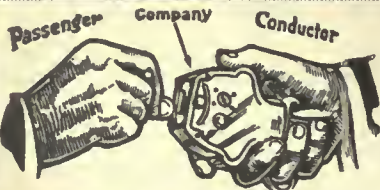
Let Us Tell You of Our Especially Designed Fare Box for the

ONE MAN CAR

THE CLEVELAND FARE BOX COMPANY

Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd., Preston, Ontario



**Direct
Automatic
Registration**
By the
Passengers

**Rooke Automatic
Register Co.**
Providence, R. I.

**PROVIDENCE
FENDERS**

**H-B
LIFE GUARDS**

The Consolidated Car Fender Co., Providence, R. I.

Wendell & MacDuffie Co., 110 E. 42nd St., New York

General Sales Agents

BRAKE SHOES

AERA Standards
Brake Heads



Diamond "S" Steel Back and Lug Shoes
best for all equipment.

Manufactured and sold under U. S.
Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

W. J. Jeandron
345 Madison Avenue, New York

Pittsburgh Office: 634 Wabash Bldg.

Chicago Office: 1657 Monadnock Block

San Francisco Office: 525 Market Street

Canadian Distributors: Lyman Tube & Supply Co., Ltd.,
Montreal and Toronto

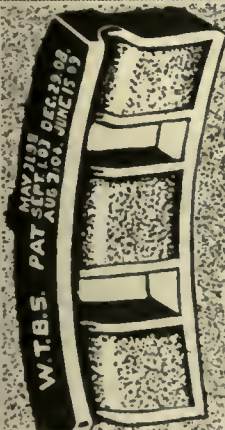
*Defective Wheels
Corrected While They Run*

WHEEL TRUING BRAKE SHOES

—keep your cars and wheels in
service. Abrasive blocks in vari-
ous sections correct flattening or
wear on any part of flange or
tread. Write for booklet.

Wheel Truing Brake Shoe Co.
Detroit, Mich.

Trade Mark—Wheel Truing Brake
Shoe



We make a specialty of
**ELECTRIC RAILWAY
LUBRICATION**

We solicit a test of TULC
on your equipment

The Universal Lubricating Co.
Cleveland, Ohio

Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City



Car Heating and Ventilation

are two of the winter problems that you must
settle without delay. We can show you how
to take care of both, with one equipment.
Now is the time to get your cars ready for
next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.



Electrical Insulation and Headlinings
THE PANELYTE COMPANY, Trenton, N. J.

RAILWAY UTILITY COMPANY

CAR COMFORT WITH
UTILITY

**HEATERS
REGULATORS
VENTILATORS**

141-151 West 22d St.
Chicago, Ill.

Write for
Catalogue

1328 Broadway
New York, N. Y.

SAMSON SPOT WATERPROOFED TROLLEY CORD

*Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.*

SAMSON CORDAGE WORKS, BOSTON, MASS.

DIXON'S

Silica-Graphite

PAINT

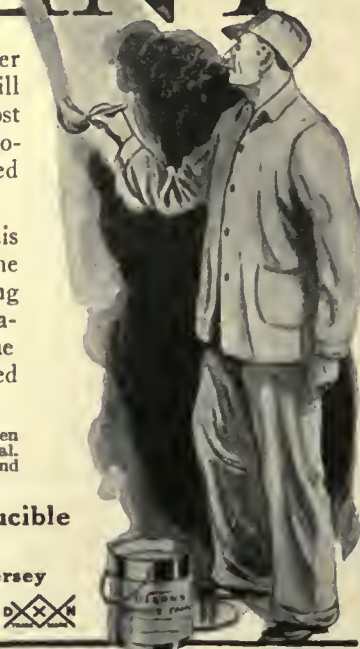
judged by the cost per year of service will prove to be the most economical for the protection of all exposed metal or woodwork.

The longevity of this paint is due to the peculiar, wear-resisting pigment,—flake silica-graphite,—and the vehicle, pure boiled linseed oil.

Records of from ten to fifteen years service are not unusual. Write for Booklet 180-B and long service records.

Joseph Dixon Crucible Company
Jersey City, New Jersey

Established 1827



Complete satisfaction

Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

No-wear Check Pawl
Free-Winding Tension Spring
Ratchet Wind
Emergency Release
Perfect Automatic Lubrication

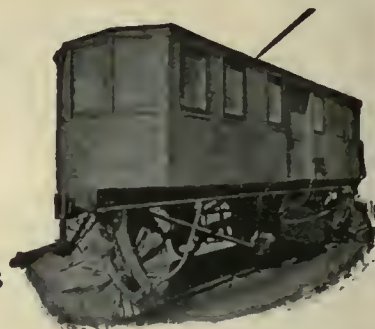
Earll Catchers and Retrievers
C. I. EARLL, York, Pa.



McGuire-Cummings Manufacturing Co.

General Offices:
111 W. Monroe St., Chicago, Ill.

Street Cars
Trucks
Snow Sweepers



M-J No. 10 Lubricated Type Trolley Wheel

Equipped in our No. 6 harp on the bottle-shape principle which prevents fouling or catching overhead lines.

Detailed information and prices on request.

Designed for high speed, simplicity and economy.

**More-Jones
Brass & Metal Co.**
St. Louis, Mo.

HALE-KILBURN CAR SEATS

For Every Class of Service

General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No.
478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

SEARCHLIGHT SECTION

POSITIONS VACANT

CAR designers, experienced on steel passenger railroad cars and trucks for high speed electric service wanted for work in the East. Applicants will please state age, experience in detail, salary expected and when they will be available for employment. P-777, Electric Railway Journal, 10th Ave. at 36th St., New York.

ELECTRICAL engineer with good technical training and about eight years' experience in electric light, power and railway public utility work. Location, large city in Brazil. In applying please give full particulars regarding self and experience, stating also salary desired and when available. P-778, Electric Railway Journal, 10th Ave. at 36th St., New York.

SPECIAL track work draftsmen wanted, preference given men having had experience with special track work manufacturer, but will consider one or two junior draftsmen familiar with trigonometry. State age, experience and salary in first letter. P-774, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

MASTER mechanic having had twenty years' practical experience on small road in New England desires similar position. Unquestionable references and ability assured. PW-776, Electric Railway Journal, 10th Ave. at 36th St., New York.

GENERAL repairman, 12 years' experience on armature winding, and electric equipment, on city and interurban equipment. PW-779, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of equipment thoroughly experienced and successful in the efficient maintenance of auto buses, city and interurban cars, desirous to change. Confidential interview solicited. PW-771, Electric Railway Journal, 10th Ave. at 36th St., New York.

WANTED

Orders for Oak, Car Stock, Cross Ties, Switch Ties, Timber

Have four mills in operation. A good stand of timber. Grades guaranteed. Prices right. Let's get acquainted.

ENARC LUMBER MFG. CO.
411 A. G. U. W. Bldg., Little Rock, Ark.

WE WANT TO BUY

30—West. 306-C.V.-4

MOTORS

Have you any to offer?

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

AIR COMPRESSORS

160—Whe D-1-F

TRANSIT EQUIPMENT COMPANY

Core—Motore

501 Fifth Avenue, New York

TO HELP YOU

SELL USED EQUIPMENT

"Searchlight" Advertising

G-2



In Small Lots
As Well As Large

THERE is a class of rail buyers, occasionally in need of only small tonnages, who are paying a premium on their purchases elsewhere because they believe that we do not seek their patronage.

We maintain a large organization to give efficient service on small orders. Our tremendous volume gives us unequalled buying power and saves our clients money regardless of the tonnage required.

Immense stocks at strategic distributing points provide complete assortments near you. This adds a saving in freight to our already unbeatable prices.

Next time you need rails, let us know your requirements.

We guarantee the same prompt, efficient service to all.

HYMAN-MICHAELS COMPANY

"The House of Dependable Service"

122 South Michigan Avenue, Chicago

Dealers in New and Relaying Rails,
Locomotives and Railway Equipment

District Offices: New York, Woolworth Bldg.;
St. Louis, Railway Exchange Bldg.; Pittsburgh, First Nat'l Bank Bldg.;
San Francisco, 234 Stewart St.

Yards: St. Louis, East Chicago, Ind., McKee's Rocks, Pa., San Francisco.

Cable Address: "Hymanmikel"

World's Largest Distributors of Rails

FOR SALE: The following gears can be disposed of for immediate delivery:

Type	Teeth	Bore	Solid or Split	No. Gears
GE-70 and 80.....	71	5.485"	solid	124
GE-70 and 80.....	71	5.500"	split	20
GE-1000.....	67	4.870"	solid	9
GE-1000.....	67	4.500"	split	2
GE-1000.....	67	4.000"	split	2
GE- 800.....	69	4.000"	split	1
GE- 74.....	67	6.000"	split	9

If interested, please communicate with

The Milwaukee Electric Railway & Light Company

Purchasing Agent

Public Service Building, Milwaukee, Wisconsin

WANTED

USED PORTABLE SUB-STATION

Will buy or rent one used portable sub-station, 500 to 1000 kw.-600-v.D.C. output, complete with control equipment, car and accessories. Rotary converter preferred. Also transformers for use with above, to be used with 4000 or 23000-00-v. primaries.

Bidders to submit proposals to

L. R. WAGNER, E.E.

Department of Street Railways, St. Jean and Shoemaker Aves., Detroit, Michigan

Relaying Rails NEW RAILS - ACCESSORIES

Buy Guaranteed
Relaying Rails
and Save 30%
to 50%

1 Ton or 1000

LB FOSTER CO

PITTSBURGH, PA. NEW YORK CITY
JERSEY CITY - PHILADELPHIA - HAMILTON, O.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

- | | | | | |
|---|--|--|--|--|
| <p>Advertising, Street Car
Collier, Inc., Barron G.</p> <p>Air Receivers, Aftercoolers
Ingersoll-Rand Co.</p> <p>Ammeters
Weston Electrical Instrument Co.</p> <p>Anchor, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.</p> <p>Armature Shop Tools
Elec. Service Supplies Co.</p> <p>Automatic Return Switch
Stand
Ramapo Ajax Corp.</p> <p>Automatic Safety Switch
Stand
Ramapo Ajax Corp.</p> <p>Automobile Trucks
General Motors Truck Co.</p> <p>Axles
Johnson & Co., J. R.
Taylor Elec. Truck Co.</p> <p>Axles, Car Wheel
Beale Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.</p> <p>Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The</p> <p>Batteries, Dry
Nichols-Lintern Co.</p> <p>Bearings and Bearing Metals
General Electric Co.
More-Jones Brass & Metal Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.</p> <p>Bearings, Center and Roller
Side
Baldwin Locomotive Wks.
Stucki Co., A.</p> <p>Bells and Gongs
Brill Co., The J. G.
Consolidated Car Heating Co.
Elec. Service Supplies Co.</p> <p>Benders, Rail
Railway Track-work Co.</p> <p>Bodies, Bus
Superior Motor Coach Body Co.
Auto Body Co.</p> <p>Boilers
Babcock & Wilcox Co., The</p> <p>Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.</p> <p>Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.</p> <p>Bonds, Rail
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse Elec. & M. Co.</p> <p>Book Publishers
McGraw-Hill Book Co.</p> <p>Boxes, Switch
Johns-Praet Co.</p> <p>Brackets and Cross Arms
(See also Poles, Ties, Posts etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.</p> | <p>Brake Adjusters
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.</p> <p>Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.</p> <p>Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.</p> <p>Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse Elec. & M. Co.</p> <p>Brush Holders
Anderson Mfg. Co., A. & J. M.</p> <p>Brushes, Wire Pneumatic
Ingersoll-Rand Co.</p> <p>Bulkheads
Haskelite Mfg. Co.</p> <p>Bunkers, Coal
American Bridge Co.</p> <p>Buses, Motor
Brill Co., The J. G.
International Harvester Co.
International Motor Co.
Six Wheel Co.</p> <p>Bushings, Case Hardened and Manganese
Brill Co., The J. G.
E. G. Long Co.</p> <p>Cables
(See Wires and Cables)</p> <p>Cambrie Tapes, Yellow & Black Varnish
Irrington Varnish & Ins. Co.</p> <p>Cambrie Yellow & Black Varnish
Mica Insulator Co.</p> <p>Carbon Brushes
(See Brushes, Carbon)</p> <p>Car Lighting Apparatus
Elec. Service Supplies Co.</p> <p>Car Mfrs. Ass'n
Railway Car Mfrs. Ass'n.</p> <p>Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.</p> <p>Car Wheels, Rolled Steel
Bethlehem Steel Co.</p> <p>Cars, Dump
Differential Steel Car Co., Inc.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.</p> <p>Cars, Passenger, Freight Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
Thomas Car Wks., Perley A. Wason Mfg. Co.</p> <p>Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.</p> <p>Cars, Self-Propelled
General Electric Co.</p> | <p>Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.</p> <p>Castings, Gray Iron and Steel
American Bridge Co.</p> <p>Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Horne & Ebling Corp.</p> <p>Catchers and Retrievers, Trolley
Earl, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.</p> <p>Catenary Construction
Archbold-Brady Co.</p> <p>Change Carriers
Cleveland Fare Box Co.
Galef, J. L.</p> <p>Circuit Breakers
General Electric Co.
Westinghouse Elec. & M. Co.</p> <p>Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. M. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Westinghouse Elec. & M. Co.</p> <p>Cleaners and Scrapers, Track
(See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
Ohio Brass Co.</p> <p>Clusters and Sockets
General Electric Co.</p> <p>Coal and Ash Handling
(See Conveying and Hoisting Machinery)</p> <p>Colls, Armature and Field
General Electric Co.
Westinghouse Elec. & M. Co.</p> <p>Coll Banding and Winding Machines
Electric Service Sup. Co.
Westinghouse Elec. & M. Co.</p> <p>Colls, Choke and Kieking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.</p> <p>Coin-Counting Machines
Cleveland Fare Box Co.
Galef, J. L.
International Register Co.
The Johnson Fare Box Co.</p> <p>Coin Sorting Machines
Cleveland Fare Box Co.
Galef, J. L.</p> <p>Coin Wrappers
Cleveland Fare Box Co.
Galef, J. L.</p> <p>Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.</p> <p>Commutator Truing Devices
General Electric Co.</p> <p>Commutators or Parts
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.</p> <p>Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.</p> <p>Compressors, Air, Portable
Ingersoll-Rand Co.</p> <p>Compressors, Gas
Ingersoll-Rand Co.</p> <p>Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.</p> | <p>Condenser Papers
Irrington Varnish & Ins. Co.</p> <p>Conduits, Underground
Std. Underground Cable Co.</p> <p>Connectors, Solderless
Westinghouse Elec. & M. Co.</p> <p>Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.</p> <p>Controllers or Parts
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.</p> <p>Controller Regulators
Electric Service Supplies Co.</p> <p>Controlling Systems
General Electric Co.
Westinghouse Elec. & M. Co.</p> <p>Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.</p> <p>Copper Wire
Anaconda Copper Mining Co.</p> <p>Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Koolings Sons Co., John A.
Samson Cordage Works</p> <p>Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.</p> <p>Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.</p> <p>Cranes
Allis-Chalmers Mfg. Co.</p> <p>Cross Arms (See Brackets)</p> <p>Crossings
Ramapo Ajax Corp.</p> <p>Crossing Foundations
International Steel Tie Co.</p> <p>Crossing Frogs and Switches
Ramapo Ajax Corp.</p> <p>Crossings, Manganese
Bethlehem Steel Co.
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.</p> <p>Crossing Signals (See Signal Systems, Highway Crossing)</p> <p>Crossings, Track, (See Track, Special Work)</p> <p>Crossings, Trolley
Ohio Brass Co.</p> <p>Crushers, Rock
Allis-Chalmers Mfg. Co.</p> <p>Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Supplies Co.
Morton Mfg. Co.</p> <p>Dealers' Machinery
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.</p> <p>Derailing Switches, Tee Rail
Ramapo Ajax Corp.</p> <p>Destination Signs
Electric Service Supplies Co.</p> <p>Detective Service
Wish Service, P. Edward</p> <p>Door Operating Devices
Consolidated Car Heating Co.
National Pneu. Co., Inc.
Safety Car Devices Co.</p> <p>Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale-Kilburn Co.</p> <p>Doors, Folding Vestibule
National Pneumatic Co., Inc.</p> | <p>Draft Rigging, (See Couplers)</p> <p>Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.</p> <p>Dryers, Sand
Electric Service Supplies Co.</p> <p>Ears
Ohio Brass Co.</p> <p>Electric Grinders
Railway Track-work Co.</p> <p>Electrodes, Carbon
Indianapolis Switch & Frog Co.
Railway Track-work Co.</p> <p>Electrodes, Steel
Indianapolis Switch & Frog Co.
Railway Track-work Co.</p> <p>Electrical Wires and Cables
American Elec. Works
Roebblings Sons Co., J. A.</p> <p>Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Beeler, John A.
Buchanan & Layne
Bureau of Commercial Economics, Inc.
Bylesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe E.
Railway Audit & Inspection Co.
Richey, Albert S.
Dwight P. Robinson & Co.
Sanderson & Porter
Shaw, Henry M.
Stevens & Wood, Inc.
Stone & Webster</p> <p>Engineers Inspecting & Chemists
Pittsburgh Testing Laboratory</p> <p>Engines, Gas, Oil and Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.</p> <p>Exterior Side Panels
Haskelite Mfg. Co.</p> <p>Fare Boxes
Cleveland Fare Box Co.
Galef, J. L.
Nat'l Ry. Appliance Co.</p> <p>Fences, Woven Wires and Fence Posts
Amer. Steel & Wire Co.</p> <p>Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Electric Service Sup. Co.
Star Brass Works</p> <p>Fibre and Fibre Tubing
Westinghouse Elec. & M. Co.</p> <p>Field Colls (See Colls)</p> <p>Flangeway Guards, Steel
W. S. Godwin Co., Inc.</p> <p>Flaximum Insulation
Nat'l Ry. Appliance Co.</p> <p>Floodlights
Electric Service Sup. Co.</p> <p>Floors
Haskelite Mfg. Co.</p> <p>Forgings
Carnegie Steel Co.</p> <p>Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Ramapo Ajax Corp.</p> <p>Frogs, Track, (See Track Work)</p> |
|---|--|--|--|--|

Variable Capacity Regulation

This Feature *Means* Dollars Saved

A mine's compressor must have sufficient capacity to meet the present or contemplated maximum demand for air. At the same time it should operate efficiently when delivering partial capacity so that the cost of air does not become excessive when the demand falls off.

The I-R Patented 5-step Clearance Control is the proven method of variable capacity regulation for air compressors.

Ingersoll-Rand Class "XCB" Compressors, using this control, deliver automatically—full, three-quarter, one-half, one-quarter, or none of their rated capacity. And, the horsepower required is reduced practically in proportion to the reduction in capacity.

For details request Bulletin No. 3142.

INGERSOLL-RAND COMPANY

11 Broadway, New York

Offices in all principal Domestic and Foreign Cities

• For Canada refer—Canadian Ingersoll-Rand Co., Limited,
260 St. James Street, Montreal, Quebec.

783-C



Ingersoll-Rand

16972-1


- Frogs, Trolley**
Ohio Brass Co.
- Fuses and Fuse Boxes**
Consolidated Car Heating Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Fuses, Refillable**
General Electric Co.
- Garages, Steel**
Austin Co.
- Gaskets**
Westinghouse Tr. Br. Co.
- Gas-Electric Cars**
General Electric Co.
- Gas Producers**
Westinghouse Elec. & M. Co.
- Galvanometers**
Weston Electrical Instrument Co.
- Gates, Car**
Brill Co., The J. G.
- Gear Blanks**
Bethlehem Steel Co.
Carnegie Steel Co.
- Gear Cases**
Chillingworth Mfg. Co.
Electric Service Supp. Co.
Westinghouse Elec. & M. Co.
- Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Electric Service Supp. Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.
- Generating Sets, Gas-Electric**
General Electric Co.
- Generators**
Allis-Chalmers Mfg. Co.
English Electric Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Order Rails**
Bethlehem Steel Co.
Lorain Steel Co., The
- Goggles, Protector**
Indianapolis Switch & Frog Co.
- Gongs (See Bells and Gongs)**
- Greases (See Lubricants)**
- Grinders and Grinding Supplies**
Indianapolis Switch & Frog Co.
- Railway Track-work Co.**
- Grinders, Portable**
Railway Track-work Co.
- Grinders, Portable Electric**
Railway Track-work Co.
- Grinding Blocks and Wheels**
Railway Track-work Co.
- Guard Rail Clamps**
Ramapo Ajax Corp.
- Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.
- Guards, Trolley**
Electric Service Supp. Co.
Ohio Brass Co.
- Hammers, Pneumatic**
Ingersoll-Rand Co.
- Harps, Trolley**
Anderson M. Co., A. & J. M.
Electric Service Supp. Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
- Headlights**
Electric Service Supp. Co.
General Electric Co.
Ohio Brass Co.
- Headlining**
Haskelita Mfg. Co.
Panelyte Co.
- Heaters, Car (Electric)**
Consolidated Car Heating Co.
- Gold Car Heating & Lighting Co.**
- Heaters, Car, Hot Air and Water**
Electric Service Supp. Co.
Smith Heater Co., Peter Wm.
- Helmets, Welding**
Indianapolis Switch & Frog Co.
- Railway Track-work Co.**
- Holets, Portable**
Ingersoll-Rand Co.
- Hose, Bridge**
Ohio Brass Co.
- Hydraulic Machinery**
Allis-Chalmers Mfg. Co.
- Indicating, Signals**
Nichols-Lintern Co.
- Inspecting Engineers & Chemists**
Pittsburgh Testing Laboratory
- Instruments, Measuring, Testing and Recording**
Electric Service Supp. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Weston Electrical Instrument Corp.
- Insulating Cloth, Paper and Tape**
Anchor Webbing Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Standard Underground Cable Co.
Westinghouse E. & M. Co.
- Insulating Machinery**
Amer. Ins. Machinery Co.
- Insulating Silk**
Irvington Varnish & Ins. Co.
- Insulating Varnishes**
Irvington Varnish & Ins. Co.
- Insulation (See also Paints)**
Anderson M. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Supp. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Westinghouse Elec. & M. Co.
- Insulation Cloth Paper & Tape**
Mica Insulator Co.
- Insulation, Slot**
Irvington Varnish & Ins. Co.
- Insulator Pins**
Electric Service Supp. Co.
Hubbard & Co.
- Insulators (See also Line Material)**
Anderson M. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Supp. Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
- Interior Slide Linings**
Haskelita Mfg. Co.
- Jacks (See also Hoists and Lifts)**
Electric Service Supp. Co.
National Ry. Appliance Co.
- Journal Boxes**
Brill Co., The J. G.
- Junction Boxes**
Horne & Ebling Corp.
Standard Underground Cable Co.
- Lamp Guards and Fixtures**
Anderson M. Co., A. & J. M.
Electric Service Supp. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Arc and Incandescent (See also Headlights)**
Anderson M. Co., A. & J. M.
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Signal and Marker**
Nichols-Lintern Co.
- Lanterns, Classification**
Nichols-Lintern Co.
- Letter Boards**
Haskelita Mfg. Co.
- Lighting Arrestors**
Shaw, Henry M.
- Lightning Protection**
Anderson M. Co., A. & J. M.
Electric Service Supp. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
- Line Material (See also Brackets, Insulators, Wires, Etc.)**
Anderson M. Co., A. & J. M.
Archbold-Brady Co.
Electric Ry. Equipment Co.
Electric Service Supp. Co.
English Electric Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Westinghouse Elec. & M. Co.
- Locomotives, Electric**
Baldwin Locomotive Wks.
General Electric Co.
Westinghouse Elec. & M. Co.
- Locomotives, Oil Engine, Electric Driven**
Ingersoll-Rand Co.
- Lubricating Engineers**
Universal Lubricating Co.
- Lubricants, Oil and Grease**
Universal Lubricating Co.
- Lumber (See Poles, Ties, etc.)**
- Manganese Steel Guard Rails**
Ramapo Ajax Corp.
- Manganese Steel, Special Track Work**
Bethlehem Steel Co.
Indianapolis Switch & Frog Co.
- Manganese Steel Switches, Frogs and Crossings**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Mica**
Mica Insulator Co.
- Motor and Generator Sets**
General Electric Co.
- Motor Buses (See Buses, Motor)**
- Motormen's Seats**
Brill Co., The J. G.
Electric Service Supp. Co.
Wood Co., Chas. N.
- Motors, Electric**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Nuts and Bolts**
Allis-Chalmers Mfg. Co.
Barbour-Stockwell Co.
Bethlehem Steel Co.
Hubbard & Co.
- Oils (See Lubricants)**
- Oxygen**
International Oxygen Co.
- Packing**
Electric Service Supp. Co.
Westinghouse Tr. Br. Co.
- Paints and Varnish Preservatives**
Baldwin Locomotive Wks.
Joseph Dixon Crucible Co.
- Paints and Varnishes for Woodwork**
National Ry. Appliance Co.
- Pavement Breakers**
Ingersoll-Rand Co.
- Paving Guards, Steel**
W. S. Godwin Co., Inc.
- Paving Material**
Amer. Br. Shoe & Fdry. Co.
- Pickups, Trolley Wire**
Electric Service Supp. Co.
Ohio Brass Co.
- Pinion Pullers**
Electric Service Supp. Co.
General Electric Co.
Wood Co., Chas. N.
- Pinions (See Gears)**
- Pins, Case Hardened, Wood and Iron**
Electric Service Supp. Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Planers (See Machine Tools)**
- Plates for Ten Rail Switches**
Ramapo Ajax Corp.
- Pliers, Rubber Insulated**
Electric Service Supp. Co.
- Pneumatic Tools and Accessories**
Ingersoll-Rand Co.
- Pole Line Hardware**
Bethlehem Steel Co.
Ohio Brass Co.
- Pole Reinforcing**
Hubbard & Co.
- Poles and Ties, Treated**
Bell Lumber Co.
- Poles, Metal Street**
Bates Expanded Steel Truss Co.
Electric Ry. Equip. Co.
Hubbard & Co.
- Poles, Ties, Posts, Piling and Lumber**
Bell Lumber Co.
Southern Cypress Mfrs. Ass'n.
- Poles, Trolley**
Anderson M. Co., A. & J. M.
Nuttall Co., R. D.
- Poles, Tubular Steel**
Elec. Ry. Equip. Co.
Electric Service Supp. Co.
- Pathways**
Okonite Co.
- Power Saving Devices**
Nat'l Ry. Appliance Co.
- Pressure Regulators**
General Electric Co.
Westinghouse Elec. & M. Co.
- Pumps**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
- Pumps, Vacuum**
Ingersoll-Rand Co.
- Punches, Ticket**
International Register Co.
The Wood Co., Chas. N.
- Rail Braces and Fastenings**
Ramapo Ajax Corp.
- Rail Joints**
Carnegie Steel Co.
- Rail Joints, Welded**
Indianapolis Switch & Frog Co.
- Rail Grinders (See Grinders)**
- Rails, Relaying**
L. B. Foster Co.
Hyman-Michaels Co.
- Rails, Steel**
Carnegie Steel Co.
L. B. Foster Co.
- Railway Safety Switches**
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.
- Railway Welding (See Welding Processes)**
- Rattan**
Brill Co., The J. G.
Electric Service Supp. Co.
Hale-Kilburn Co.
- Registers and Fittings**
Brill Co., The J. G.
Electric Service Supp. Co.
International Reg. Co., The
Rooke Automatic Reg. Co.
- Regulators, Voltage**
Leeco-Neville Co.
- Reinforcement, Concrete**
Amer. Steel & Wire Co.
Bethlehem Steel Co.
Carnegie Steel Co.
- Repair Shop Appliances (See also Coil Banding and Winding Machines)**
Electric Service Supp. Co.
- Repair Work (See also Cords)**
General Electric Co.
Westinghouse Elec. & M. Co.
- Replacers, Car**
Electric Service Supp. Co.
- Resistance, Grid**
Monitor Controller Co.
- Resistance, Wire and Tube**
General Electric Co.
Westinghouse Elec. & M. Co.
- Resistances**
Consolidated Car Heating Co.
- Retrievers, Trolley (See Catchers and Retrievers, Trolley)**
- Rheostats**
General Electric Co.
Monitor Controller Co.
Westinghouse Elec. & M. Co.
- Roofs**
Haskelita Mfg. Co.
- Sanders, Track**
Brill Co., The J. G.
Electric Service Supp. Co.
Nichols-Lintern Co.
Ohio Brass Co.
- Sash Fixtures, Car**
Brill Co., The J. G.
Horne & Ebling Corp.
- Sash, Metal, Car Window**
Hale-Kilburn Co.
- Scrapers, Track (See Cleaners and Scrapers, Track)**
- Screw Drivers, Rubber Insulated**
Electric Service Supp. Co.
- Seating Materials**
Brill Co., The J. G.
- Seats, Bus**
Hale-Kilburn Co.
- Seats, Car (See also Rattan)**
Brill Co., The J. G.
Hale-Kilburn Co.
- Second-Hand Equipment**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.
- Shades, Vestibule**
Brill Co., The J. G.
- Shovels**
Hubbard & Co.
- Shovels, Power**
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.
- Signals, Car Starting**
Consolidated Car Heating Co.
Electric Service Supp. Co.
Nat'l Pneumatic Co., Inc.
- Signals, Indicating**
Nichols-Lintern Co.
- Signal Systems, Block**
Electric Service Supp. Co.
Nachod Signal Co., Inc.
Union Switch & Signal Co.
U. S. Electric Signal Co.
Wood Co., Chas. N.
- Signal Systems, Highway Crossing**
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
- Slack Adjusters (See Brake Adjusters)**
- Slag**
Carnegie Steel Co.
- Sleeve Wheels and Cutters**
Anderson M. Co., A. & J. M.
Electric Ry. Equip. Co.
Electric Service Supp. Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
- Smokestacks, Car**
Nichols-Lintern Co.
- Snow-Plows, Sweepers and Brooms**
Brill Co., The J. G.
Consolidated Car Fender Co.
- Soldering and Brazing (See Welding Processes and Apparatus)**
- Spikes**
Amer. Steel & Wire Co.
- Special Adhesive Papers**
Irvington Varnish & Ins. Co.
- Special Trackwork**
Bethlehem Steel Co.
Lorain Steel Co., The
- Splicing Compounds**
Westinghouse Elec. & M. Co.
- Splicing Sleeves (See Clamps and Connectors)**
- Springs, Car and Truck**
Brill Co., The J. G.
Fl. Pitt. Spring & Mfg. Co.
St. Louis Car Co.
Taylor Electric Truck Co.
- Sprinklers, Track and Road**
Brill Co., The J. G.
- Steel and Steel Products**
Morton Mfg. Co.
- Steps, Car**
Morton Mfg. Co.
- Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse Elec. & M. Co.
- Storage Batteries (See Batteries, Storage)**
- Strain Insulators**
Ohio Brass Co.
- Strand**
Roebbing's Sons Co., J. A.
- Superheaters**
Babcock & Wilcox Co.
- Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**
- Switch Stands**
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.
- Switches and Switchboards**
Allis-Chalmers Mfg. Co.
Anderson M. Co., A. & J. M.
Electric Service Supp. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Switches, Selector**
Nichols-Lintern Co.
- Switches, Ten Rail**
Ramapo Ajax Corp.
- Switches, Track (See Track, Special Work)**
- Tampers, Tie**
Ingersoll-Rand Co.
Railway Track-work Co.
- Tapes and Cloths (See Insulating Cloth, Paper and Tape)**
- Tee Rail, Special Track Work**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Telephones and Parts**
Electric Service Supp. Co.
- Terminals, Cable**
Standard-Underground Cable Co.
- Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**
- Thermostats**
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

Since
1907

Other Ry. Motor Gear Mfrs.
have brought out a total of
22 grades of gearing
each one "as good as Tool Steel"
BUT
Cincinnati "Tool Steel" is still
the Standards of Quality

Tool Steel Quality

The Tool Steel
Gear and Pinion Co.
CINCINNATI, O.



"Differential Two-Car Train. Trolley dumping load clear of trench."

DIFFERENTIAL CARS
Standard on Fifty Railways for

Track Maintenance	Track Construction
Ash Disposal	Hauling Crossties
Placing Ballast	Disposal of Waste
Coal Hauling	Snow Disposal
Concrete Materials to the Job	
Excavated Material to the Dump	

For Economy
THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION
CAR-WHEEL TRUCK and TRACTOR

THE DIFFERENTIAL STEEL CAR CO.
Findlay, Ohio, U. S. A.

Turbine driven Reclaiming Machine
saves

Oil and Wiping Waste



The Oil & Waste Saving Machine Co.
1509 Real Estate Trust Bldg., Philadelphia, Pa.
Dept. D.

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the **LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.**



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

"Boyerized" Products Reduce Maintenance

Bemis Trucks	Manganese Brake Heads
Case Hardened Brake Pins	Manganese Transom Plates
Case Hardened Bushings	Manganese Body Bushings
Case Hardened Nuts and Bolts	Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.


Bemis Car Truck Co., Springfield, Mass.

SEVEN WORKS
RAMAPO-AJAX CORPORATION



RAMAPO AUTOMATIC RETURN SWITCH STANDS FOR PASSING SIDINGS
TEE RAIL SPECIAL WORK
MANGANESE CONSTRUCTION
SALES OFFICES AT ALL WORKS
Main Office, HILLBURN, N. Y.

RAMAPO-AJAX CORPORATION
HILLBURN, NEW YORK
NIAGARA FALLS, N. Y.
CHICAGO, ILLINOIS
EAST ST. LOUIS, ILL.
FUELS, COLORADO
SUPERIOR, WISCONSIN
NIAGARA FALLS, ONT.
CANADA

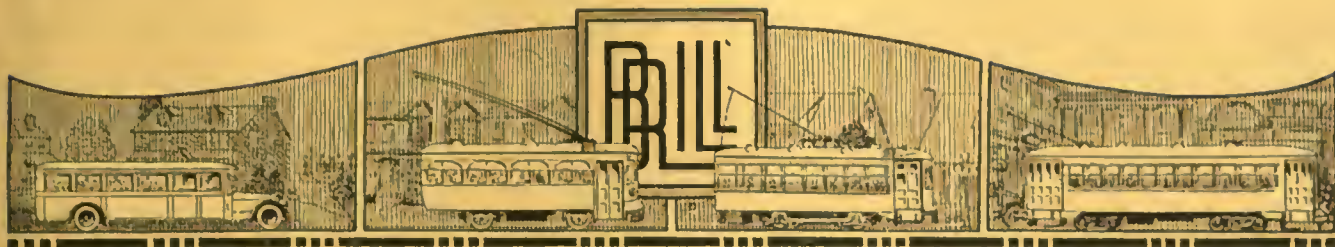


CHILLINGWORTH
One-Piece Gear Cases
Seamless—Riveted—Light Weight
Best for Service—Durability and Economy. Write Us.

Chillingworth Mfg. Co.
Jersey City, N. J.

100 New Users in the Last Nine Months
KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs

Morton Manufacturing Co., Chicago



Trenton & Mercer Co. Trac. Corp.

New City and Suburban Cars

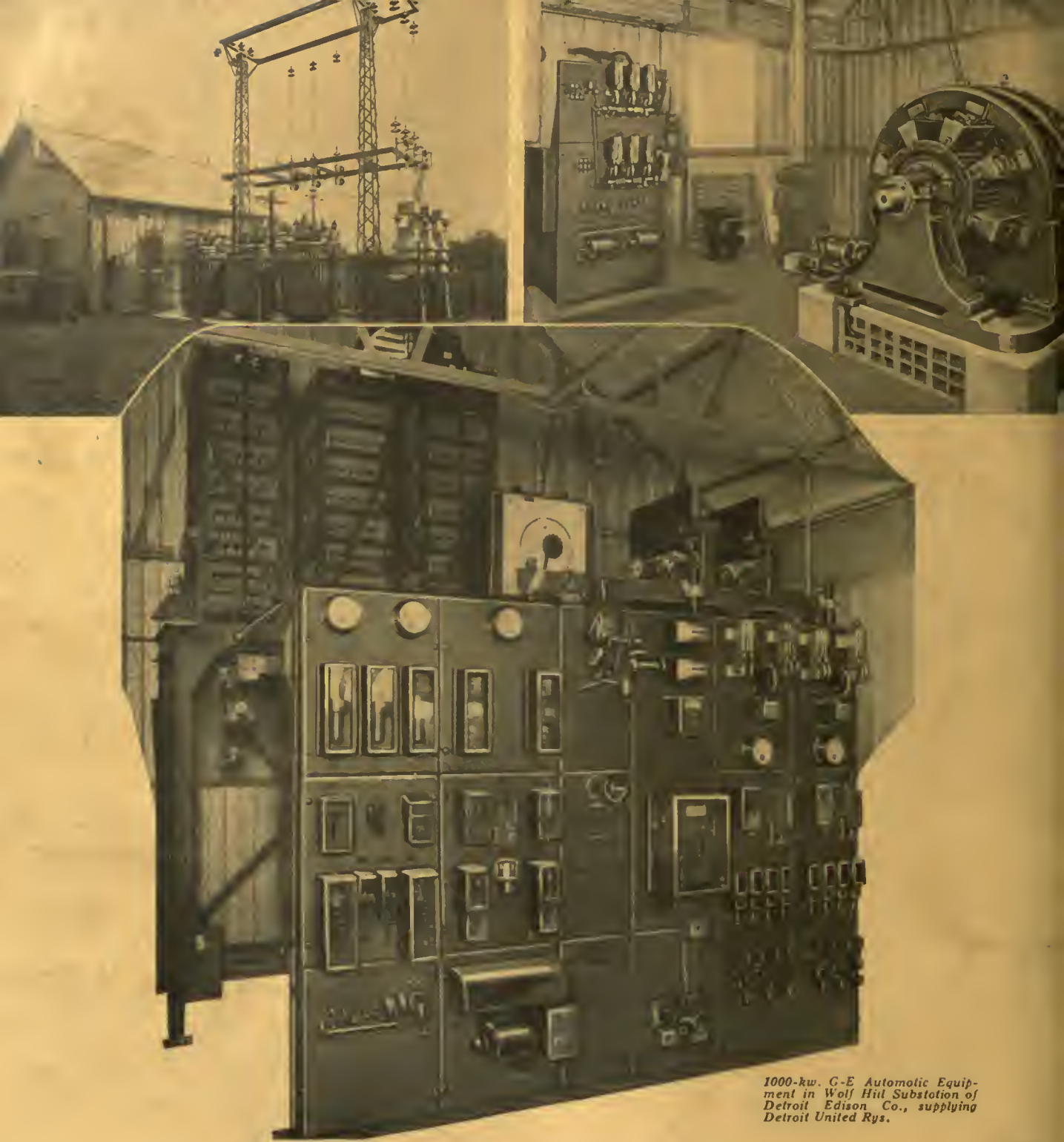
Twenty light-weight, one-man two-man cars of this type were recently built in our Philadelphia Plant for Trenton, N. J. Ten cars include quadruple 25 Hp. motor equipment for city service, and ten are equipped with quadruple 35 Hp. motors for suburban service. Otherwise, the cars

are practically identical, being mounted on Brill 77-E low-level trucks equipped with Brill Twin Swing Links, measure 44 ft. long over platforms, and seat 48 passengers.

The city cars weigh 34,476 lb. and the suburban cars 36,746 lb.

 **THE J. G. BRILL COMPANY** 
PHILADELPHIA, PA.
 AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WABSON MANFG. CO.
 ST. LOUIS, MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.





1000-kw. G-E Automatic Equipment in Wolf Hill Substation of Detroit Edison Co., supplying Detroit United Rys.

Detroit, for example

THE universal confidence in G-E Automatic Railway Substations is exemplified in Detroit where 10,000 kw. in G-E Automatics are in operation and 24,000 kw. more—14 units—are on order.



desired condition. The automatic type of substation has now passed the early development stage into economic use. A general degree of confidence seems to exist in its reliability for city and interurban service, and it is satisfactorily meeting every kind of normal or emergency load demand. Where high line switching formerly required the presence of an operator, the remotely controlled supervisory schemes of today have met this requirement.

Ordinary... 1000 kw. over a th...

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y. SALES OFFICES IN ALL LARGE CITIES

ELECTRIC RAILWAY JOURNAL



At left—Pennsylvania Avenue, Indianapolis, Ind. Installing Carey Rail Filler.

Below—Carey System of Track Insulation installed in Maryland Street tracks, Indianapolis, Ind.



Indianapolis makes her good streets *better!*

Indianapolis ranks high among her sister cities for unusually good streets.

With the Indianapolis interest in good streets it is natural that in repairing Pennsylvania Avenue and Maryland Street the Carey System of Track Insulation was used.

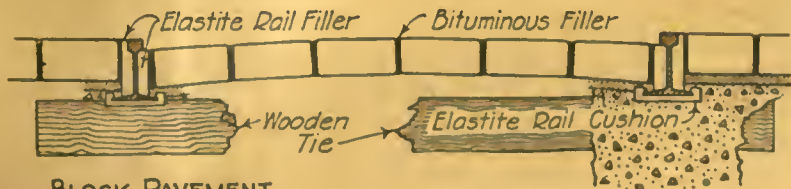
Quiet street car traffic, longer life for tracks and pavements, and a big saving in street and track repairs, are the desirable results.

Send for complete data on the Carey System of Track Insulation.

THE PHILIP CAREY COMPANY
53 Wayne Avenue, Lockland, Cincinnati, Ohio

Carey Elastite

SYSTEM OF TRACK INSULATION



BLOCK PAVEMENT

Elastite Rail Filler Is Easy To Install

a tap of a mallet holds it in the web of the rail

Carey Elastite Rail Filler is a composition of specially-tempered asphalt and fibre which is used as a resilient cushion between the rail and the pavement absorbing traffic-impact, rail vibration and traffic-noise. It is preformed to fit any rail-section and is readily shaped on the job to fit any track-curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

HOUSTON PUBLIC LIBRARY
AND CARNEGIE BRANCH
HOUSTON, TEXAS.

The Service Record

of the

St. Clair Tunnel Single-Phase Electric Locomotives



St. Clair Tunnel Electrification (Grand Trunk Railway) Canadian National Railways

Placed in service	1908
Number of motive-power units	6
Ton miles, 1909-1923 inclusive	1,026,190,000
Miles per year per locomotive (Two motive-power units)	34,457
Maintenance per locomotive mile (15 year average)	9 1/4¢
Delay in traffic, during 15 years, chargeable to Electric Operation	<u>1 Hour</u>

This service record is an example of the performance obtained from Single-Phase, Alternating-Current Equipment



Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries



Baldwin-Westinghouse

X79703

JOHN A. MILLER, Jr.
Associate Editor
C. W. SQUIER
Associate Editor
O. J. MACMURRAY
News Editor

ELECTRIC RAILWAY
JOURNAL

MORRIS BUCK, Managing Editor

HENRY W. BLAKE
Senior Editor
CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

CONTENTS

FEBRUARY 14, 1925

Editorials	245
Transporting Workers in Washington.....	247
By JOHN A. MILLER, Jr. Sharp traffic peaks caused by the simultaneous opening and closing of many government offices are a serious problem. Long-haul business has been increasing with the expansion of the city.	
Headway Recorders Show Crossing Delays.....	251
Repeated Impact Tests Are Progressing.....	252
Mayor Hylan Held Responsible for New York's Subway Ills	253
Governor Smith's special commission criticises Board of Estimate, but exonerates members of New York Transit Commission. Urges completion of existing lines with shop and yard facilities.	
Boston Educational Program	256
Eight hundred Elevated Railway employees meet regularly under "departmental group conference plan" devised to help ambitious workers secure best information available in their specialties.	
Measuring Rail Deflections Under Load.....	258
Capital Traction Has 25 per Cent 10-Year Men.....	258
German Railways Try Articulated Trains.....	259
Tests are being made at Berlin and Hamburg. Each unit of the Berlin 10-car train has five car bodies and six trucks, being used on a steam railway system in local service. The Hamburg unit with two car bodies is being used on a single-phase railway.	
Silk Screen Sign Printing Used in Detroit.....	261
By H. S. WILLIAMS.	
One-Man Cars Successful in Denver.....	263
The Readers' Forum	264
Association News and Discussion.....	265
New England Club Discusses Car Weights.....	265
Savings in operating cost due to weight reduction, use of gas-electric buses and pulverized fuel oil program.	
American Association News	267
Maintenance of Equipment	268
News of the Industry	271
Financial and Corporate	277
Personal Mention	280
Manufactures and the Markets.....	281

McGRAW-HILL COMPANY, INC.
Tenth Avenue at 36th Street, New York

JAMES H. McGRAW, President
ARTHUR J. HADWIN, Vice-President
MALCOLM MICH, Vice-President
E. J. MEHREN, Vice-President
MARION BATTON, Vice-President
JAMES H. McGRAW, Jr., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary

WASHINGTON:
Colorado Building
CHICAGO:
Old Colony Building
PHILADELPHIA:
Real Estate Trust Building
CLEVELAND:
Leader-News Building
ST. LOUIS:
Star Building
SAN FRANCISCO:
883 Mission Street
LONDON:
8 Bouverie Street, London, E. C. 4
Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations

Cable Address: "Machinist, N. Y."
Publishers of
Engineering News-Record
American Machinist
Power
Chemical and Metallurgical Engineering
Coal Age
Engineering and Mining Journal-Press
Ingenieria Internacional
Bus Transportation
Electric Railway Journal
Electrical World
Electrical Merchandising
Radio Retailing
Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
American Machinist—European Edition
(Published in London)



The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries \$3 (total \$7 or \$9 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 30 cents.
Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.
Copyright, 1925, by McGraw-Hill Company, Inc.
Published weekly. Entered as second-class matter, June 23, 1905, at the Post Office at New York, under the Act of March 3, 1879. Printed in U.S.A.

He Hardly Can
Wait for It

RECENTLY we wrote to a man who had discontinued his subscription and asked him to give frankly the reason why he did not need the paper any longer. Here is his answer:

DEAR SIR:
The reason I have not requested you to continue my subscription to the JOURNAL is that my company looks after this, having one sent to my office.
I cannot convey to you just how much I like the JOURNAL, but you will realize just what I think of it when I say that I can hardly wait for Mondays to arrive and am much peeved when I have to wait until Tuesday for it.
I appreciate the JOURNAL and could not do without it.
I will ask you to discontinue sending it to my residence as I receive it at my office.
Yours truly,
SUPERINTENDENT OF TRANSPORTATION

So the company as well as the superintendent had realized the value of ELECTRIC RAILWAY JOURNAL to such an extent that it was willing to pay for his subscription so as to keep him informed weekly in the latest developments in his line of work.

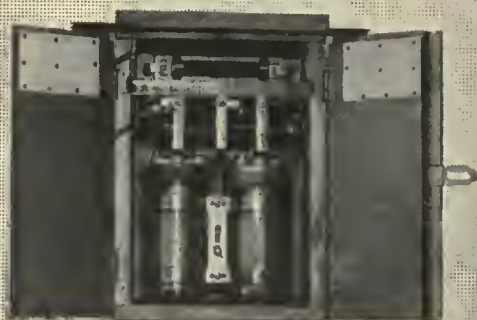
Protect Your Cars; Your Line and Your Stations with— Westinghouse Railway Lightning Arresters



MP Arrester, 100-750 Volts



Type K-3
For Voltages up to 1500



Type AR Electrolytic Arrester
For Voltages up to 3800

MP Arrester

This low-priced arrester is adequate for the protection of cars under all ordinary conditions, one to the car and five to the mile of line. It is easy to install and, once installed, requires practically no attention.

The MP arrester has a long life and affords greater freedom of discharge than any other type using series resistance.

For extra severe 600-volt, and all 1200- and 1500-volt service, for car and pole mounting, we recommend the

K-3 Arrester

This is a condenser arrester of high capacity and, like the MP, requires no attention whatever after installation. It stays on the cars the year round, having no liquids to freeze, no moving parts to wear out, and no glass parts to break.

AR Arrester

This is an electrolytic arrester having a high discharge capacity. It is recommended for station service where it can easily be given the required periodic maintenance and is not subjected to freezing temperatures.

For further details ask for a copy of Descriptive Leaflet 20021.

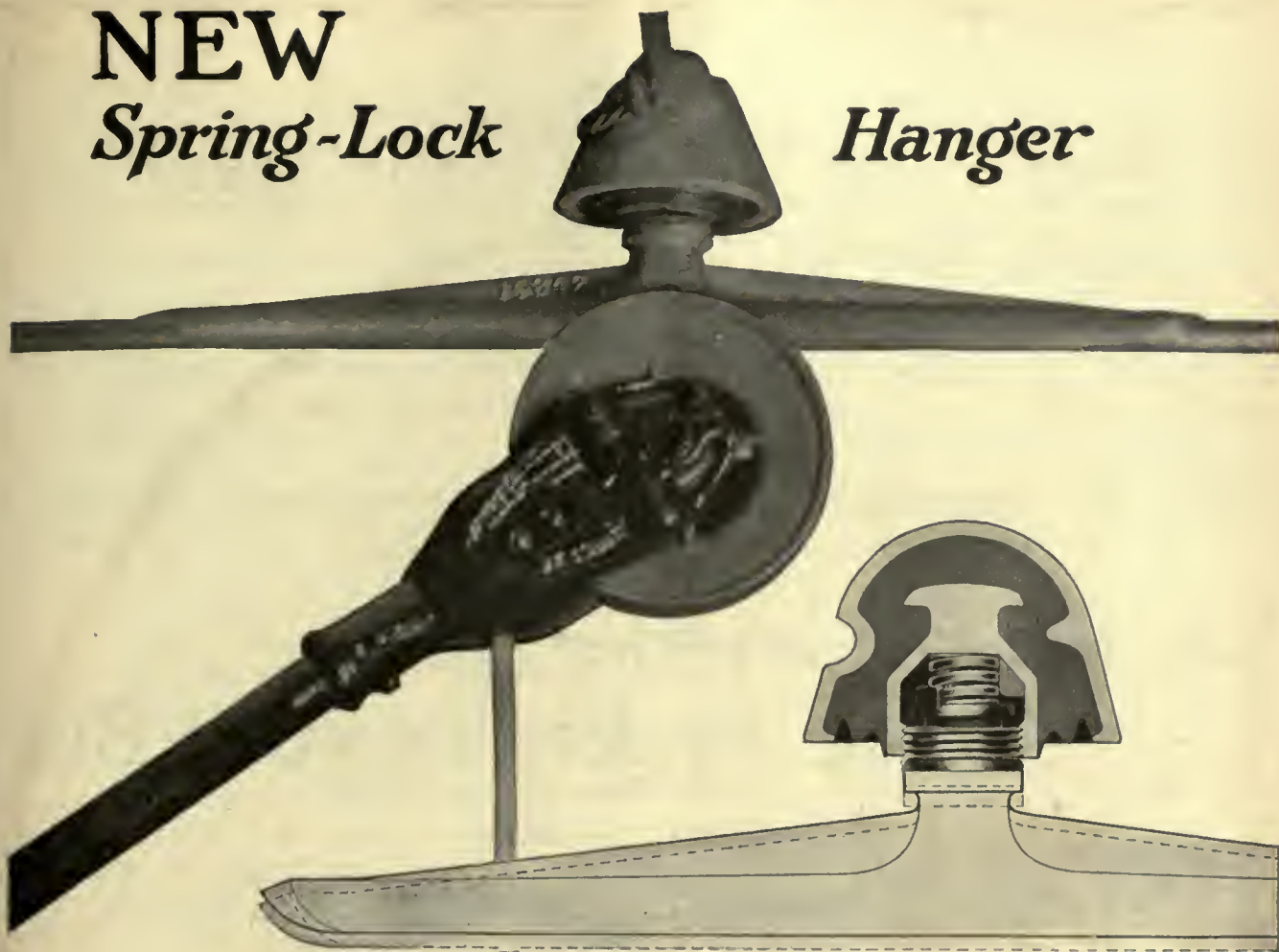
Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries



Westinghouse

X 78714

NEW *Spring-Lock* *Hanger*



O-B Builds a Shock Absorber

The new O-B Spring-Lock Hanger takes the usual hard spot out of the overhead. It interposes a spring between the ear and hanger that softens the shock from the wheel as it passes under the hanger boss. There is a give to the ear — a resilient action — that cushions the overhead and saves wear of the ear and trolley wheel.

The Spring-Lock is made for span work, as illustrated, or in a barn type.

Let us go into details with you

The Ohio Brass Co.

Mansfield, Ohio

B
LINE MATERIAL



Let the car builder put Air Brakes on your Bus



The Automotive Air Brake is completely described in our Publication 9058. A new edition is just off the press. May we send you a copy?

Have those new buses of yours equipped with Westinghouse Automotive Air Brakes at the factory. This will give you a "running start" toward the attainment of a profit-paying business.

Westinghouse Automotive Air Brakes are standard factory equipment on buses built by:

Fageol Motors Co.
(Double-deckers)

International Harvester Co.
Moreland Motor Truck Co.
(Double-deckers)

Newport Coach Co.

Schacht Motor Truck Co.

The Gosome Motor Coach Co.

Capital District Motor Corp.
(Versare Corp.)

and are included as optional factory equipment by:

Acme Motor Truck Co.

Fageol Motors Co.
(Single-deckers)

Federal Motor Truck Co.

Gotfredson Truck Corp.

Garford Motor Truck Co.

Pierce Arrow Motor Car Co.

The Six Wheel Co.

Yellow Coach Mfg. Co.

Standard Motor Truck Co.

Commerce Motor Truck Co.

International Motor Co.

WESTINGHOUSE TRACTION BRAKE CO.

Automotive Division, Wilmerding, Pa.





THE FIFTEENTH YEAR

37% More Twin Ties sold than in 1923.

80% Sold to Companies with upwards of 13 years experience with Steel Tie Construction.

20% Sold to new customers.

There is a definite relation between this record year for sales of Steel Twin Ties and Track Costs for initial installation

and maintenance on over 147 properties in the United States and Canada.

While the complete presentation of this data in our book, "Steel Tie Track Construction" is persuasive, it is not dangerous.

Expose yourself to it by directing us to mail it to your office or home.

THE INTERNATIONAL STEEL TIE COMPANY
Cleveland, Ohio

Steel Twin Tie Track

Renewable Track . . . Permanent Foundation

FORD TRIBLOC

"SAFETY FIRST" HOISTS —EVERY ONE A TRIBLOC

By resisting the surge and shock of hoisting service in the shop—the strength, safety and smooth action of Ford Triblocs are saving man power and labor hours, and speeding human effort.

Workmen appreciate the advantages of Ford Triblocs—management profits through their use.

A distinguishing feature of all Ford Triblocs—the Patented Loop Hand Chain Guide—permits operation of the hoist from any angle—a decided advantage in machining and assembling operations. It prevents the hand chain from gagging, or over-riding the flange of the hand wheel.

You can instantly recognize a Tribloc by the "Loop Guide"—*it's green.*

May we send you detailed information of other advantages which contribute to the safety, long life, and low maintenance of Ford Triblocs? Just ask for Catalog 6-B.

Capacities $\frac{1}{4}$ ton to 20 tons

FORD CHAIN BLOCK COMPANY

Second and Diamond Sts.

Philadelphia, Penna.

Bulletin 4-G tells about the "EZEEJOIN" shackle that makes chain renewals easy. May we send you a copy?



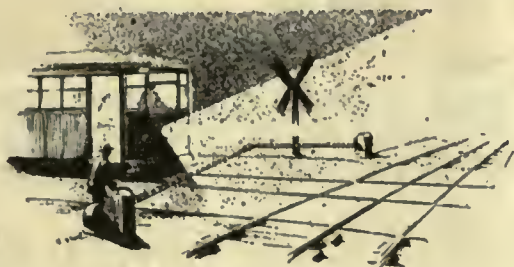
5 to 10 ton

12 to 20 ton

Differential
Hoist

Screw Hoist

2255-D



There is safety for you in the use of GOLDEN GLOW HEADLIGHTS

In the dusk of falling twilight or the mists of early dawn, in the darkest night, through storm, fog or smoke, Golden Glow cuts a pathway of brilliant light. Obstructions on the track, dangerous grade-crossings, other vehicles, animals or persons in its path are thrown into clear relief for the motorman to see. *But*—in spite of its intense illumination, penetrating as it is, the Golden Glow beam is not blinding or dazzling. The peculiar greenish-yellow glass reflector absorbs the violet rays and softens the light.

Choose a Golden Glow Headlight to suit your requirements. Consult ESSCO Catalog No. 7 for various types and sizes.



Some other items from the long list of Keystone Car Equipment.

Steel Gear Cases
Motormen's Seats
Lighting Fixtures
Headlight Resistances
Air Sanders
Trolley Catchers
Shelby Trolley Poles
Rotary Gongs
International Fare Registers
Fare Register Fittings
Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors
Automatic Door Signals
Standard Trolley Harps
Standard Trolley Wheels
Segur Coil Winding Tools
Peerless Armature Machines
Insulating Materials
Case Commutator Stones
Sand Driers
Peerless Pinion Pullers
Employees' Badges
Line Material
Portable Lamp Guards

ELECTRIC SERVICE SUPPLIES Co.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
829 Oliver Building

NEW YORK
50 Church St.

SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.

BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver



HASKELITE

and **PLYMETL**

Have revolutionized car building

A new and better type of car has been developing year by year following the introduction of HASKELITE and PLYMETL into this field. Passenger comfort, better appearance, lighter weight, lowered operating and maintenance costs are among the benefits resulting from their use.

THE superior advantages of HASKELITE and PLYMETL have impressed themselves upon car designers and engineers so that a new type of construction has resulted. Perhaps the highest development in this field is represented by the cars being placed in service on the lines operated by Day & Zimmermann, Inc. in Ohio and Pennsylvania. Two examples are shown on this page. Large sections of HASKELITE form the roofs, reinforced by a special form of pressed steel carline. No ceiling or headlining is required, the under surface of the roof being given a high character enamel finish.

PLYMETL side panels and letter boards are used, and the insulating value of this is such that no inner linings are needed. By the replacing of heavy lumber roofs, and sheet steel sides, several hundred pounds are saved in the weight of an average double truck car, reducing the operating expense \$50 or more per year.

Our Engineering Department will welcome an opportunity to discuss the application of HASKELITE and PLYMETL to your building or repair requirements.

HASKELITE
MANUFACTURING CORPORATION
133 W. Washington St., Chicago, Ill.



New cars built by J. G. Brill Co. for the York Railways, York, Pa., operated by Day & Zimmermann, Inc. This is probably the highest development at the present time, of the "HASKELITE-PLYMETL" car.

One of twenty single truck cars built by G. C. Kuhlman Co., for the Columbus, Newark and Zanesville Electric Co., for use in Zanesville, Ohio. Operated by Day & Zimmermann, Inc. HASKELITE roofs and PLYMETL side panels are distinctive features.





TREADLE-OPERATED REAR-EXIT DOOR

The Dallas Railway Company has installed a number of treadle-operated doors in their double-truck one-man cars. This arrangement has proven so satisfactory that they hope to have, in a short time, not less than 100 cars so equipped. This exit door is opened by the passenger stepping on the treadle which is placed in front of the door inside the rear platform.

NATIONAL PNEUMATIC COMPANY

Executive Office, 50 Church Street, New York

General Works, Rahway, New Jersey

CHICAGO
McCormick Building

MANUFACTURER IN
TORONTO, CANADA
Dominion Wheel & Foundries, Ltd.

PHILADELPHIA
Colonial Trust Building



Two of 44 busses owned and operated by the United Electric Railways Company, of Providence, R. I. The entire fleet is 100% General Cord equipped.



Puts 44 busses on Generals to get the lowest possible tire cost per mile

The cost sheets of the United Electric Railways Company, of Providence, R. I., explain why the management recently standardized on General Cords for its entire fleet of 44 busses.

Written there in black and white is the dollars-and-cents record of General Cord performance alongside tires of other makes—more profit-earning miles, greater comfort for passengers, lower operating costs per bus.

Riding on less inflation—and

with less internal wear—Generals cushion the bus against the jolts and jars of the road, hence virtually eliminate costly lay-ups for repairs.

General's unusually low rolling-resistance assures a tremendous saving in power and gasoline consumption, and the lowest possible cost of operation.

Small wonder fleet operators everywhere are swinging to the tire that "goes a long way to make friends."



The

GENERAL

CORD

—goes a long way to make friends

BUILT IN AKRON, OHIO, BY THE GENERAL TIRE AND RUBBER COMPANY

Seats—for 55 passengers!

FIFTH AVENUE BUSES

(Type L)

with
Adjustable
All-Weather
One-Man
Tops



With top closed in

Summer and Winter

Full Seating Capacity is Always Available

IT'S only the work of a few moments to convert the open air upper-deck to a protected, fully enclosed compartment.


Capitalize on the public's liking for the open-air ride in fair weather. At the first signs of a shower your bus operators can adjust the all-weather top, raise the drop sashes, and in a few moments the upper-deck is enclosed, protected and warm, its full seating capacity still available. Our traffic studies have shown that passengers use enclosed upper deck as freely in winter as they do the open upper deck in summer.

A 55-seated passenger vehicle, occupying only 3.4 sq.ft. of street area per seat, is the solution of the transportation problem in crowded city streets.

NEW YORK TRANSPORTATION CO.
New York, N.Y.

*No. 3 of a series showing
the utility of Mack Buses
during non-peak hours*




1900 1925
For a full quarter
century Mack interests
have been centered
on the
manufacture of
transport vehicles



atre Parties

HOW often does it happen that residents in an outlying community find it almost impossible to go to a theatre in town because of the lack of any adequate transportation after about eight o'clock in the evening?

And how popular would be the inauguration of a luxurious Mack Bus "theatre service" with one or more buses leaving outlying sections in the early evening and returning when theatres are out?

Such service, profitably operated at a special round-trip fare, helps keep the buses on the road, and earning profits, when lack of traffic in non-peak hours might necessitate temporary laying off. And what is equally important—builds up goodwill for the railway among the

more substantial residents of the community.

Use Mack Buses—built for passenger comfort and attractive appearance as well as sound practical utility.

The Mack bus is all bus. Its chassis, its powerful improved engine, its wide front axle and dual reduction rear axle, its transmission—every factor is planned to contribute to efficiency of bus operation.

Let Mack bus men work with you on your transportation problems and give you the benefit of their experience.

MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY
25 BROADWAY NEW YORK CITY

Eighty-eight direct MACK factory branches operate under the titles of "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION"

The Mack Bus



Sedan Type Bus

Performance counts!



Car Inspection Dials
on Power-Saving
Railway Meter.

There is no mystery
about Power Saving
with Economy Meters.

Meter The Energy—

CLEVELAND

orders

1076 Economy Meters

Every passenger motor car operated by the Cleveland R'way Company will be equipped with an ECONOMY Meter with power-saving and car-inspection dials. This notable purchase follows a thorough investigation of power-saving devices.

Energy input is the correct measure of the relative efficiency of different men operating under similar conditions. The motorman has faith in a meter because with it he can prove that good operation gives him a good record and poor operation a poor record, in actual energy consumption. This power-saving device actually tells the motorman and the management whether power has been saved or wasted, and how much.

That, in brief, is the underlying reason for the success of the ECONOMY Meter.

The ECONOMY "Power-saving" and Car Inspection Meter provides a method that accurately and automatically shows the car inspection interval. It also shows at a glance how much more work a car can do before inspection is needed, or, in case of a road failure, how much

work the car has done previous to the failure. All this without any clerical labor.

The ECONOMY Meter is a rugged device which requires remarkably little maintenance. Its principal element is also produced for central station and general metering. For this purpose more than 500,000 have been built. It is a standardized product, easy to maintain on a railroad at a cost averaging less than \$2.00 per year, per meter.

More than two hundred street or interurban railways are equipped and the saving resulting has more than wiped off the capital charges plus operating expenses of the meters in the first year.

The records from ECONOMY Meters are of high value for managerial and engineering purposes.

Economy Electric Devices Company

L. E. Gould, Pres., Old Colony Bldg., Chicago

Cable Address: Sangamo, Chicago

General Sales Agents

Sangamo Economy Meters
The Air Rectifier

The Aluminum Field Coils
Economy Track Greaser

District Agents for

Peter Smith Heaters
Miller Trolley Shoes
Bemis Boyerized Truck Specialties

Woods Fare Boxes
Chausse Kerosene Torch

That's What You Want To Save!



Human Reasons Behind Garford Excellence

In the mind of the man who really knows commercial cars, Garford Trucks and Coaches occupy a decidedly distinctive place. They have been put there by a definite creative policy pursued consistently for twenty-two years.

We have compiled into an attractive book some interesting and illuminating stories about the men in whose hands rest the administration and development of this policy. Reading this book will give you a better understanding than you've ever had

before of the reasons behind Garford solidity and permanency.

And you will realize better why it is that users who own, and dealers who handle, Garford Trucks and Coaches evince but little interest when someone talks about other similar vehicles at a lower first cost

This advertisement is printed as a cordial invitation for you to ask us—on your business stationery, please—for our book, "Behind the Garford." You'll find it well worth while.

Busses
15 to 35
Passengers

GARFORD

Trucks
1 to 7½
Tons

Beginning in 1902, Garford is now among the eight companies manufacturing 78% of the bona-fide trucks

THE GARFORD MOTOR TRUCK COMPANY, LIMA, OHIO

BUILDING TODAY FOR TOMORROW'S REQUIREMENTS



Galena Brake Cylinder Lubricant

A special grease for a special use

AIR BRAKE lubrication has peculiarities all its own.

After years of study of these conditions Galena developed a special lubricant to meet them. It has these characteristics:

1. The highest melting point yet reached in this class of lubricant.
2. An even texture that permits free action of pistons while
3. A persisting body that resists the wiping action of the brake cylinder.
4. A spreading power that makes Galena Brake Cylinder Lubricant cover more surface and thereby reduce lubricating costs.

Whether or not you are standardizing on Galena Products, try this Brake Cylinder Lubricant.



Galena-Signal Oil Company

New York

Franklin, Pa.

Chicago

and offices in principal cities





The best field coil is a new field coil

Sometimes it is cheaper and better to renew entirely than to make repairs. Maintaining field coils is a case in point.

Take G-E Coils for instance. They are filled with an asphaltum compound by the vacuum pressure process; the compound so penetrates the winding that it seals the coil against the entrance of moisture, improves its thermal conductivity and greatly increases its capacity.

Our factory facilities are being enlarged to meet the increasing demand.

**Your Text
Book
on
Equipment
Standards**



General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities



GENERAL ELECTRIC

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

MORRIS BUCK, *Managing Editor*

Volume 65

New York, Saturday, February 14, 1925

Number 7

Every Company Should Enter the Coffin Prize Contest

FOR the third time the invitation has been issued to the electric railways of the United States to compete for the Coffin Prize. This contest, which is one of several instituted by the Charles A. Coffin Foundation, has as its chief object the stimulation of progress by electric railways. In the past two years successful competitions have been held in which not only the prize winners but the other contestants have shown the great amount of improvement, material and financial, that could be made in electric railway operation, often under what appeared to be adverse conditions.

The best practices of and results obtained by the companies that competed in the two previous contests have been published in considerable detail in the *ELECTRIC RAILWAY JOURNAL*. The American Electric Railway Association itself collected similar material from the 1923 competition in an attractive book which has had wide circulation among electric railways. It is now preparing a similar book based on the 1924 contest.

With such examples before them it would seem that it is not only the privilege but the duty of every electric railway management to take all steps possible to secure similar improvements. And having embarked on a modernization program, it is a further duty to publish to the industry the results that have been obtained and the methods through which they have been achieved. There is no better way of accomplishing this than by entering the Coffin Prize contest.

Some managements have refrained from entering these contests because of a feeling that there was no one in the organization with time and ability to prepare a brief.

In order to make a creditable showing it is neither necessary that a railway go to great expense to collect data nor engage the services of a professional writer to present them. Any railway man with fairly broad experience ought to be able to give in simple language a good description of the noteworthy things his company is doing.

Let every railway, large or small, get together its list of achievements and submit them in this year's competition.

A Practical Scheme for Starting Educational Work

ONE of the convincing signs that electric railways have come back is their increasing interest in vocational training of employees. Only industries which are firmly established and are looking forward to larger opportunities and responsibilities are interested in education. Any railway manager will assent to the value of mental training. As a family head he wants it for his children; as a utility head, for his staff. But,

generally speaking, managers are not educators; they do not know how to start instructional work. They ought to be helped in this direction by the experience of the Boston Elevated Railway this season, as described in an article in this issue. On that property, under the personal direction of General Manager Edward Dana, five series of "departmental group conferences" are being held with remarkable results as to attendance and spirit.

The plan is not radically new. That is one of its best features, as it utilizes methods that have proved out in practice. It is merely a systematizing and amplifying of conferences such as all progressive railways hold from time to time. The *ELECTRIC RAILWAY JOURNAL* believes that other railways would profit by following this plan as a foundation for later, more intensive, educational work.

New York Transit Situation Has Been Clarified

JUDGE McAVOY'S report on the New York transit situation clears away the fog of misunderstanding that has existed for years. It puts the blame for the existing rapid transit status where it belongs, and it pillories the Mayor as a subject for the scorn and the contempt of his fellow citizens. Had the McAvoy report been made as the result of hearings by a legislative committee, it would not have possessed anywhere near the influence which it now has. The present Legislature of New York is Republican, and a report by a bipartisan investigating committee would have been open to the charge of bias. But the McAvoy report is by a Democratic Judge to a Democratic Governor about a Democratic Mayor, and it is a Democratic administration which is so strongly criticised in the statement just made public.

Baiting of street railways has been a popular political pastime ever since there have been such railways. The baiting has differed in degree but not in kind. In this respect the situation in New York under the Hylan régime is not unique. It is unique, however, in the ferocity of the attacks upon the companies and in the consequences that have followed to the general public in the impairment of the services rendered to them. Many other instances will occur to railway men of demagogues who have bid for popular support by attacks on local transit systems. In some of these instances, political preferment has been gained—for a time. The ultimate result, however, has always been the same—final acceptance by the public at large that oppression of its transportation utility is a public injury. When that fact comes to be realized, the rejection of the politician who advocates persecution follows quickly. This is the result that may reasonably be expected to follow in the wake of the so-called McAvoy report in regard to the responsibility for the failure to

supply transit relief. In fact, this is the result that will follow in New York City unless that city is politically degenerate beyond belief.

McAvoy Report

Is Essentially Constructive

SO MUCH for the political aspects of the matter. There is, however, an entirely different side to the report. This is the constructive side. The judge's duty was, of course, to fix the responsibility. This he certainly has done, but in so doing he has found it expedient to make suggestions for the future. They are necessarily a by-product, but they are significant. Many of these suggestions have for their purpose the correction of things obvious even to the casual observer. Now the weight of unbiased authority has been added to them. The constructive recommendations include suggestions that the 14th Street and the Ashland Place link should be completed by the city with all possible speed; that subway platforms be lengthened to accommodate 10-car trains on the Interborough and eight-car trains on the Brooklyn-Manhattan system; that the Nassau Street loop be built at once; that more trains be run in the non-rush hours, and that more guards be employed in train operation. These are only some of the things. For many of them the railways have been persistent advocates. Very few of them are within the powers of the companies to correct themselves without the co-operation of the city. As for the suggestion of additional guards, there is no benefit to any one in having a train overmanned. Reduced service in non-rush hours was imposed largely by the lack of shop facilities.

But all the shortcomings for which the companies can reasonably be held to be accountable are insignificant compared with the indictment of the Mayor and the Board of Estimate for their repeated and persistent refusals to validate new routes and to approve construction contracts and by so doing frustrate provisions for increasing transit facilities. On the very few counts made against them the railways have now obtained a clear-cut statement of how the matter appears to the unbiased outsider. They will miss a great opportunity if they do not set to work at once to correct these minor omissions and then do not capitalize the improvement by going before the public and making it plain to it wherein they have sought to do their part. It is a fact that the Transit Commission and the companies themselves were not held to be entirely blameless, but as the *New York Times* has so aptly pointed out, all the things for which they are held to be remiss are only trifles compared with the way in which Mayor Hylan has thrown himself athwart rapid transit progress. As for the Mayor's pet schemes of bus operation and the construction of the freight tunnel to Staten Island, they are both severely condemned by Judge McAvoy as now sought to be carried out.

Possibilities of broad relief for the future remain to be determined. An extension of the city's borrowing powers for the construction of additional subways, even if such a measure had smooth sailing, would take several years, and if the city had this additional borrowing power it might easily devote the money to the recapture of the existing lines. In that case the public, with municipal operation, would undoubtedly be

far worse off as regards transit than at present. The precedent in other cities indicates that the logical step is some form of fare increase to attract capital, but no one in public office yet has dared to indorse such a plan. Until some one in authority has the courage to advocate that the lines be placed on a self-supporting basis, the outlook for any great expansion of New York's rapid transit systems is poor.

Specifying \$10,000,000 Purchases of Special Trackwork

THE use of standard specifications for the purchase of materials has taken great strides in the last decade. The work of such bodies as the American Society for Testing Materials, the American Railway Engineering Association and the American Electric Railway Engineering Association in the preparation of specifications for various materials has had a marked influence in propagating the use of standard specifications.

Such specifications, if adequate, are of benefit both to seller and purchaser. There is little need to emphasize this. But there may well be a need for pointing out to the industry that it will be amply repaid if it will see to it that those charged with the purchase of special trackwork shall apply the several specifications of the Engineering Association covering their requirements.

To a certain extent, it appears, the method of specification at present consists in telling some manufacturer that a crossover, for instance, is wanted, made of girder rail and of hard center construction and that it is needed "yesterday." The manufacturer is left to his own devices as to many important details. It is a tribute to him to say that he usually furnishes satisfactory material, largely on his honor.

Without adequate, verified data but with some study given the subject, it is judged that the industry normally purchases special trackwork renewals to the value of more than \$10,000,000 yearly. If this purchase were all made by one company the standard specifications certainly would be applied and the material would also be most carefully inspected at the mill.

It was to cover the diversified purchases by many companies that the Engineering Association adopted its special trackwork specifications. When the aggregate of individual purchases is contemplated, there can be no doubt as to the wisdom of making purchases under them.

The matter of inspection, however, is rather difficult since competent service by inspecting firms is believed to be somewhat rare. This may be due, in large measure, to the quite general failure of the industry to require shop inspection of special work before shipment. A reasonable demand for such service would soon develop a reliable supply, and some recent observations indicate the growth of a real need for adequate shop inspection. The word adequate is used advisedly. No shop will object to competent inspection, but the incompetent work of an inspector is justly disliked by the producer and, in the end, is apt to react against the purchaser. No inspection can be adequate without proper specifications. The latter are available and the industry should see that they are used. The former is available to some extent, and fair, adequate inspection services can be developed, once the need is apparent.

Transporting Workers in Washington

Sharp Traffic Peaks Caused by the Simultaneous Opening and Closing of Many Government Offices Are a Serious Problem—Long-Haul Business Has Been Increasing with the Expansion of the City—Buses Are Used Extensively in Outlying Districts

By John A. Miller, Jr.

Associate Editor *ELECTRIC RAILWAY JOURNAL*



When the Employees Are Leaving the Government Offices at 4:30 P.M. a 20-Second Headway Is Required on Pennsylvania Avenue to Handle the Traffic

ELECTRIC railway operation in the city of Washington is carried on under conditions that differ in many respects from those encountered elsewhere in the United States. Washington, which now is co-extensive with the District of Columbia, is not an industrial city, nor is it to any considerable extent a commercial city. Its chief activities are all connected with the federal government. It is said that approximately 90 per cent of the people using the street railways in the District are government employees. As nearly all of the governmental offices open simultaneously at 9 o'clock and close at 4:30, two extremely sharp traffic peaks are produced. The sharpness of the peaks is accentuated by the lack of early morning and late afternoon industrial workers.

Washington, being the capital city and attracting many visitors, is one of the show places of the entire country. Constant effort is being made to beautify it, and the railways spare no expense to conform to all plans for civic improvement. To eliminate poles and wires from the streets the underground conduit system is in use in the central portion of the city in preference to the overhead trolley. This, of course, makes construction and maintenance more expensive for the railways.

On the other hand, according to President Coolidge's recent statement at the budget meeting the average salary of government employees is something less than \$1,800 a year. Although this may necessitate many of

these people riding in street cars instead of in their own automobiles, it also causes them to favor the lowest possible street car fare. The problem of the companies, therefore, is to keep the quality of service as high as is demanded by the special situation in Washington, while keeping the rate of fare down to a minimum.

A third unusual phase of the railway situation in Washington is the existence of two large independent companies. The Washington Railway & Electric Company, with about 500 passenger cars and approximately 173 miles of track, is somewhat larger than the Capital Traction Company, which operates 350 cars on about 64 miles of track. The annual gross revenue of the latter is slightly under \$5,000,000, while that of the former is about 30 per cent larger. Both companies are engaged in bus operation, but the activities of the Washington Railway & Electric Company are at present somewhat the more extensive. Three other electric railways connect Washington with surrounding towns, but they fill no important rôle in local transportation.

CAPITAL TRACTION COMPANY HANDLES MUCH SHORT-HAUL TRAFFIC

Speaking generally, the Capital Traction Company has been carrying more short-haul traffic and has been faced by a more serious problem of rush-hour congestion than has the Washington Railway & Electric Company. The principal lines of the former are on 14th

Street and Pennsylvania Avenue. The routes are shown in detail on the accompanying map.

Probably the point of most serious traffic congestion in the city is the intersection of Pennsylvania and New York Avenues at 15th Street. Through this bottle neck the Capital Traction Company operates the greater part of its service. At this point the 14th Street and the Pennsylvania Avenue routes of the Capital Traction

sengers in the non-rush hours, and during the rush hour 100 passengers per 100 seats plus 1 passenger for every 7 sq.ft. of standing area in the car. From the point of view of passenger comfort, this ruling is liberal. It is claimed, however, that to insure seats for all, when the passengers present themselves at irregular times, more seats must be provided than for the actual number of people carried in the cars. It may be noted that the average carrying value in every 15-minute period of the check tabulated here was greater than the average number of passengers on the cars during this period.

Illustrating the severity of the peak condition, throughout the day the average number of cars passing 14th and K Streets in a 15-minute period is fewer than 10, whereas during the maximum period shown in the table it was 43. That means an average headway of approximately 20 seconds. When a United States Senator recently complained of inadequate service on 14th Street, it was pointed out that the present service practically equals the track capacity during the rush hour. In fact, it is said that on account of the continuous stream of cars going north and south there is hardly sufficient time for the movement of east and west traffic.

Company join. Pennsylvania Avenue is no longer the principal traffic artery on the system. Fourteenth Street has for several years exceeded it in volume of business and in cars operated. A good idea of the serious congestion may be obtained from the accompanying table which shows the traffic carried on southbound cars passing 14th and K Streets during the morning rush.

An interesting point in this connection is that the morning peak on the lines of the Capital Traction Company is more severe than that in the afternoon. This is accounted for in large measure by the fact that the government employees must get to work promptly and they all move simultaneously toward the central part of the city where most of the offices are located. They

The headways on Pennsylvania Avenue are nearly as short as those on 14th Street. An accompanying illustration shows the afternoon rush-hour condition on the avenue at the time when the government workers are leaving their offices on their way home. Traffic congestion on Pennsylvania Avenue itself is not particularly bad, as the street is straight and wide between the Capitol and the Treasury. But where the stream of cars meets those from west of the White House and those from 14th Street the congestion is extreme. In fact, it is only because of a special handling of vehicle traffic at 15th Street and New York Avenue that the street cars can be moved without interruption. The wye intersection of the tracks has been roped off so that vehicles cannot enter upon or cross them at this point. Vehicles can proceed east or west, but through traffic on 15th Street is prohibited. Even with this assistance careful supervision is required to get the cars through the intersection without delay. Considerable improvement was effected some little time ago by the relocation of stops and the installation of loading platforms as recommended by John A. Beeler, consulting engineer.

In order to accommodate the people with thorough service of the kind they have been taught to expect, a very complicated system of interlocking schedules is in effect on the lines of the Capital Traction Company. For example, the time-table specifies that alternate cars going in the direction of Georgetown shall cross the new bridge over the Potomac River to Rosslyn while the rest go to 36th and M Streets, the old terminal. Similarly on 14th Street the schedule distributes outbound cars among five different terminals. A sample headway sheet for use by a street inspector and reproduced here shows the same thing.

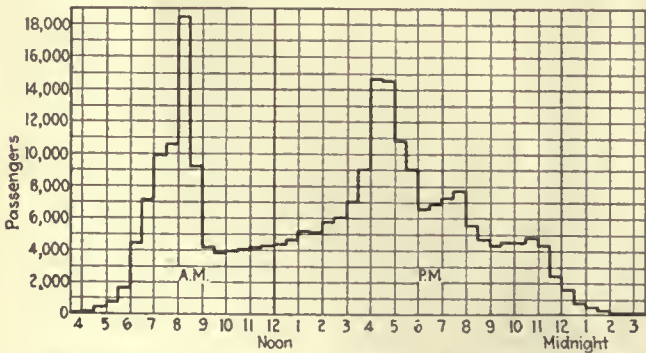
UNIFORM EQUIPMENT FACILITATES ROUTING

The Capital Traction Company is fortunate in having rolling stock that is almost uniform. A standard double-truck, double-end, two-man car was adopted some

TRAFFIC READINGS—MORNING RUSH, SOUTHBOUND
Location: 14th and K Sts., N. W.

Period Beginning A. M.	Passengers				Carrying Value				Cars			
	First Day	Second Day	Third Day	Average	First Day	Second Day	Third Day	Average	First Day	Second Day	Third Day	Average
6.30	202	264	249	238	377	433	433	414	6	7	7	6.7
6.45	255	245	248	249	417	426	426	423	7	7	7	7.0
7.00	360	289	259	303	489	426	425	447	8	7	7	7.3
7.15	385	369	426	393	480	491	556	509	8	8	9	8.3
7.30	470	503	458	477	547	610	547	568	9	10	9	9.3
7.45	581	566	563	570	749	751	749	750	12	12	12	12.0
8.00	917	786	918	874	1,131	1,012	1,140	1,094	18	16	18	17.3
8.15	1,630	1,817	1,659	1,702	1,703	2,057	1,927	1,896	28	34	32	31.3
8.30	2,128	2,293	2,239	2,220	2,546	2,554	2,449	2,516	43	44	42	43.0
8.45	1,501	1,319	1,434	1,418	1,710	1,382	1,565	1,552	29	23	26	26.0
9.00	536	582	576	565	679	726	724	710	11	12	12	11.7
9.15	401	341	386	376	948	1,015	958	974	16	17	16	16.3
Total.	9,366	9,374	9,415	9,385	11,771	11,883	11,899	11,851	195	197	197	196.3
Ave.	.....	.....	.....	9,385	.....	.....	.....	11,851	.....	.....	.....	196.3

Weather—First day, clear; second day, cloudy; third day, cloudy.



Total Passengers Carried on All Lines of the Capital Traction Company During a Typical Fair Day

are in less haste to return home and are likely to do some shopping on the way.

Traffic checks are taken several times a year by the time-table department of the railway and the Public Utilities Commission in order properly to adjust service to actual conditions. In parallel columns in the table are shown by 15-minute periods the passengers carried on three successive days and the carrying value of the cars passing the point where the check was taken. This carrying value is established by the Public Utilities Commission on the basis of 125 seats per 100 pas-



Car and Bus Lines of the Capital Traction Company and the Washington Railway & Electric Company Do Not Duplicate Each Other's Service to Any Considerable Extent. Two Bus Lines Are Jointly Operated

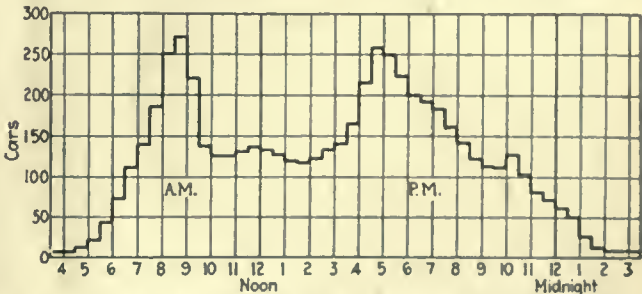
time ago. Except for minor changes this design has been followed in recent purchases. That the cars are so nearly alike is a great help to the time-table department, which is thereby enabled to combine trips from one section of the city with trips to any other section on the same run, and without the necessity of giving special consideration to the type of car. In this connection the roller signs have been arranged to display all destinations on the system.

Every effort is made to have the cars attractive in appearance both inside and out. Even in the latest design of car the monitor roof has been retained because the management feels that there is a certain psychological advantage in making it possible for the passenger actually to see the open ventilators. It is thought that this is largely lost with the arch roof and inconspicuous ventilators. All cars have electric heat. Thermostatic control has recently been installed. Another improvement has been the removal of fenders. At one time a city ordinance required both fenders and life guards, but now the fenders have been done away with and only the life guards are used.

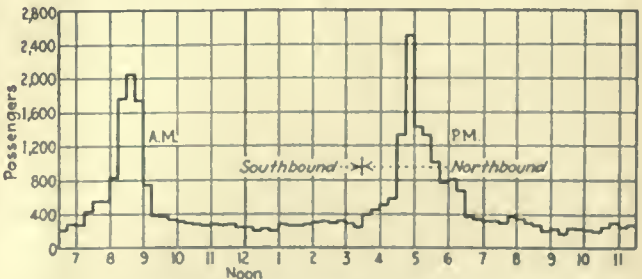
For nearly 30 years the Capital Traction cars have been painted the same color. Variations have occurred in striping and painting of the window posts, etc., but the bright green body color has remained unchanged. An interesting feature of the policy of this company is that there is no definite date when a car is sent to the shop and entirely repainted. On the contrary, small defects are repaired as soon as they are noticed and painting is done whenever and wherever it is needed. Every car is, however, entirely revarnished once a year. A recent change in the headlining color from the former greenish tone to an ivory white has improved the interior appearance. The wood trim is rubbed down and left with a dull finish. This rubbing down is thought to be important because it re-

moves the effect of extreme newness. A passenger does not feel when he gets into a car that has been recently revarnished inside that it is fresh from the paint shop; it simply looks neat and clean and like the other cars of the company.

To reduce the noise of operation the Capital Traction Company is using helical gears with Westinghouse 514-C ventilated motors and American Electric Railway Engineering Association standard axle and journal box assembly. These gears have been in use since 1919 and it is believed by the company's engineers that they are as quiet today as when they were new. Old spur gears are being replaced by helical gears as rapidly as



Cars Operated by 1-Hour Periods During a Typical Day



Traffic Curve at 14th and K Streets

they wear out. The management of this company believes that the helical gears show less wear under the difficult service conditions in Washington than do the spur gears.

Another step which the company has taken in the direction of noise elimination is the use of seam and thermit welded rail joints. The underground conduit construction which is used in Washington has a tendency to exaggerate the noise of car operation, and great care must therefore be taken to eliminate as much rattle and bang as possible. In 1909 this company adopted a standard type of track construction using A.E.R.E.A. 7-in., 122-lb. grooved girder rail, and has adhered to it ever since.

WASHINGTON RAILWAY & ELECTRIC COMPANY
OPERATES MANY LONG LINES

The traffic situation facing the Washington Railway & Electric Company differs in many respects from that of the Capital Traction Company. The first-mentioned railway has many long lines where, in the past, the riding has been comparatively light, and which have been operated at a loss.

The remarkable growth of the city during and since the war has resulted in a shifting of the center of population and business to the west and north. New centers have sprung up in the outlying portions of the District and in Maryland, where the Washington Railway & Electric has been running cars for years through sparsely settled territory. Business has shifted to some extent from the lower streets of the city and has invaded sections that were previously strictly residential. This has brought increased traffic to the company, but despite such expansion the traffic density is considerably less than that on the lines of the Capital Traction Company.

Routes of the Washington Railway & Electric Company run out through Georgetown and along the Potomac River to Cabin John Bridge, far out Massachusetts and Wisconsin Avenues to Rockville, north to Forest Glen, and also northeast to Laurel and East Riverdale, Maryland.

Because traffic is light on a number of the company's lines one-man cars are used to good advantage. Experiments have been made with automatic rear-exit doors on two of such cars, as told in this paper for Aug. 30, 1924. To differentiate them from the other one-man cars, the dashers of the automatic-door cars have been painted yellow. Some objection has been made to the operation of street cars in Washington by

only one man and the whole subject is under general discussion.

Not all of the lines, however, are light-traffic suburban routes. The Mount Pleasant line operates out Connecticut Avenue to Columbia Heights through one of the most rapidly growing portions of the city and has extremely heavy riding. Moreover, the character of the population in this section is such that scrupulous attention must be paid at all times to the quality of service. When snowstorms occur, as happens occasionally in Washington, this is one of the first lines on which the railway operates its plows and sweepers. In spite of the unusually difficult weather conditions the present winter, with snowstorms that were said to be of greater severity than occurred for many years, all the city lines were kept open. Riding on the Ninth Street line is also very heavy now due to the increase in population in the Georgia Avenue neighborhood.

In May, 1922, the Washington Railway & Electric Company first undertook bus operation on a line between Mount Pleasant and Petworth connecting three of its car lines, Mount Pleasant, 11th Street and Georgia Avenue. Since that time the company has added bus service to Rock Creek Park, to Potomac Park, in the eastern portion of the city to serve the new Eastern High School and at the terminus of its Congress Heights line in Maryland. Rail service on Bladensburg Road to Riverdale has been replaced by bus service with the consent of the people there and with the approval of the Public Service Commission of Maryland. The Washington Railway & Electric Company is at present operating 23 buses. Permission has been asked to operate on a new crosstown line. If the permit is granted the company plans to purchase five new six-wheel buses to operate on this route.

BOTH COMPANIES ARE USING BUSES

Two bus lines are operated jointly by the Washington Railway & Electric Company and the Capital Traction Company. These are the Woodley Road and Southwest routes. No boulevard bus service is now being operated by either railway. A service having some such characteristics, however, is operated on 16th Street by an independent concern, the Washington Rapid Transit Company. The Capital Traction Company has a number of feeder lines of its own in addition to the joint routes. The locations of the various bus lines are shown on the accompanying map.

Efforts are being made in certain quarters to have all future bus operation under separate control rather than in the hands of the railways. This issue is acute at the moment in connection with a proposed crosstown bus line. Both the Rapid Transit company and the Washington Railway & Electric Company desire to operate this route. It is thought by experienced transportation men that separate control of bus and railway service in Washington would be particularly undesirable because of the sharpness of the traffic peaks already described. The number of passengers to be carried during the rush hour is so much greater than during the rest of the day that none but a large and well-organized transportation agency could possibly provide adequate facilities. Buses under the control of the railways and operated in conjunction with their cars are much more likely to fit in with the general transportation system than are privately owned buses. The agitation in favor of separate ownership, therefore, appears to be a move in the wrong direction.

Southbound on 14th Street in A.M. Rush—Weekday—1-19-25									
Run No.	Takoma	14th & Colo.	14th & Dec.	14th & Park	14th & U. Sts.	For			
272	—	8-08 ²	8-11	8-17	8-22 ²	USta	o		
291	—	—	—	8-17 ²	8-23	RP.			
73	—	—	8-11 ²	8-17 ²	8-23	PMt.			
5	—	—	8-12	8-18	8-23 ²	8 & F			
16	—	—	8-12	8-18 ²	8-23 ²	USta.			
274	—	8-10	8-12 ²	8-18 ²	8-24	Gtn.			
522	—	—	—	8-19 ²	8-24 ²	N.Yd.			
67	Train	—	8-13	8-19	8-24 ²	RP.	o		
64	—	—	8-13 ²	8-19 ²	8-25	USta.			
292	—	—	—	8-20	8-25 ²	26 & 6			
239	—	—	8-15 ²	8-21 ²	8-27	RP.			
58	—	8-13 ²	8-16	8-22	8-27 ²	N.Yd.			
259	—	—	8-17	8-22 ²	8-28	RP.			
40	—	—	8-17	8-23	8-28 ²	C & L			
43	UND-WD	8-14 ²	8-17	8-23	8-28 ²	USta.	o		
252	—	—	8-17 ²	8-23 ²	8-29	PMt.			
543	—	—	—	8-24	8-29 ²	N.Yd.			
404	7-59	8-15 ²	8-18	8-24	8-29 ²	N.Yd.	o		
293	—	—	—	8-24 ²	8-30	USta.			
268	—	8-16	8-18 ²	8-24 ²	8-30	USta.			
7	—	—	8-19	8-25	8-30 ²	RP.			
6	—	8-17	8-19 ²	8-25 ²	8-31	8 & F	o		
266	—	—	—	8-26	8-31 ²	Ross			
51	8-02	8-18	8-20 ²	8-26 ²	8-32	N.Yd.			
544	—	—	8-21	8-27	8-32 ²	N.Yd.			

Street Inspectors' Headway Sheet

U Sta = Union Station
P P = Potomac Park
P Mt = Peace Monument
8 & F = Eighth and F Streets
Gtn = Georgetown
N Yd = Navy Yard
26 & G = Twenty-sixth and G Streets
C & L = Capitol and Library
Und-wd = Underwood
Ross = Rosslyn

Efforts have been made from time to time, not only by local people but by Congress, to compel the amalgamation of the Capital Traction Company and the Washington Railway & Electric Company into a single organization. Just at present such a combination is definitely forbidden by law, but a bill is under consideration in Congress to permit a voluntary merger. It is proposed, moreover, by some of those who favor amalgamation, that the companies should be forced to combine if they fail to take advantage of the permission contained in the proposed bill.

Just how much good would result from a combination is problematical. It has been said that transfer facilities would be improved and operating economies made possible. There is undoubtedly some merit in the first of these contentions. As to the second, it would be possible to make operating economies now if the railways were permitted to reroute their cars and discontinue some of the more complicated through trips which they now make. The public, however, is opposed to any such plan now and probably would be opposed to a similar plan resulting from the combination of the companies.

At present there is little duplication of service by the two companies. In fact, the 16th Street bus line of the Washington Rapid Transit Company is a more outstanding example of duplication of service than can be found on the railways in Washington. It is curious that the people who appear strongly to favor combination of the railways favor also the separation of control of the railway and bus systems.

Headway Recorders Show Crossing Delays

The Time of Each Car Is Indicated at Points on Both Sides of the Railroad Right-of-Way, and Any Delays Due to Blockades Are Thus Indicated

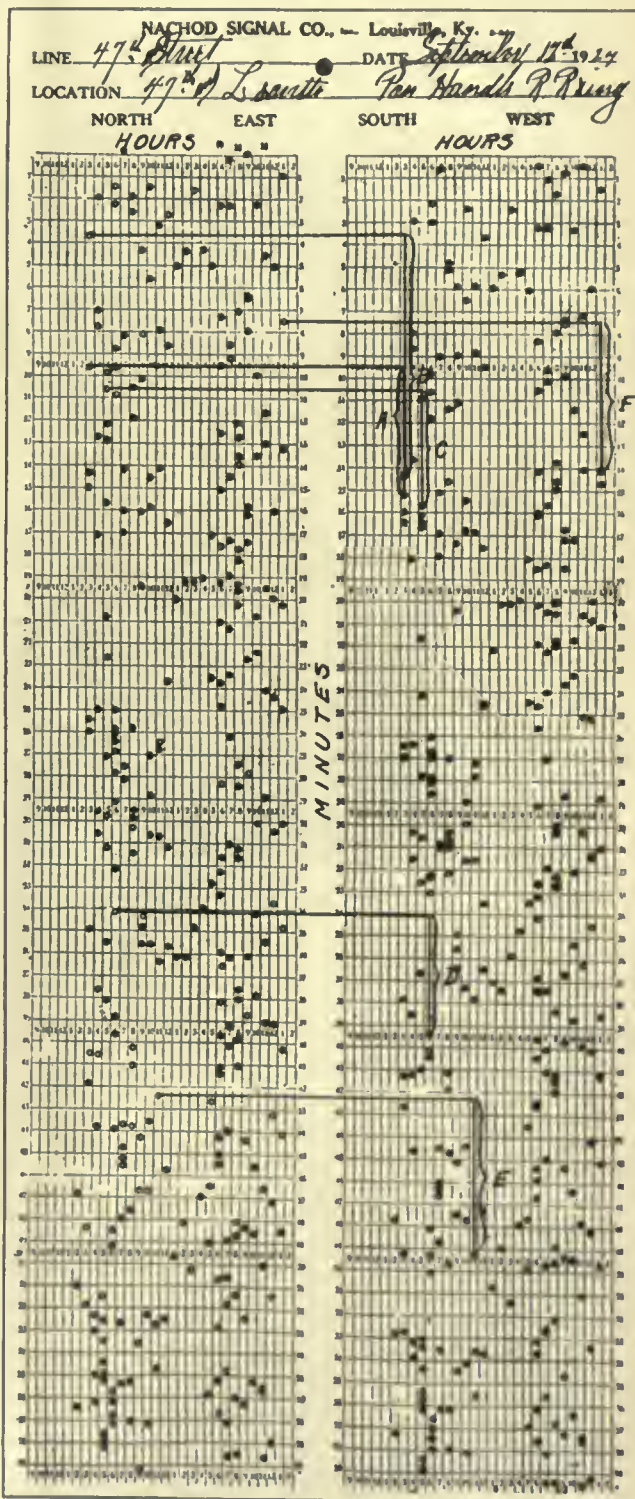
AN INTERESTING use of Nachod headway recorders is that on the Chicago Surface Lines for checking delays to street car service caused by blockades at steam railroad crossings. A time limit for railroad switching operations at crossings has been established by city ordinances. The recorders are used to make a permanent record of the time taken by each car in getting across the railroad right-of-way, and the exact time and duration of delays are thus brought to light.

The form of record obtained is shown in the accompanying illustration. This chart is divided into two parts, on one of which is indicated the time on one side of the crossing, while the second gives the time on the other side. The instrument is mounted on one track only of a double-track line, it being assumed that any serious delay will show up in the record obtained for the one track.

Heavy black lines have been drawn horizontally, and the time intervals in minutes, where delays occurred, are shown by brackets, marked A, B, C, etc. The delay marked E will serve as an illustration of the use of the chart. In this case a car arrived at the east side of the crossing at the time indicated by the small circle on the extreme left end of the heavy horizontal line. The vertical column indicates that this was during the hour of 11 and the horizontal lines show the time to be slightly less than 11:42½. The first circle in the corresponding vertical column on the right side of the

chart, after 11:42½, gives the time this car arrived on the opposite side of the crossing. As shown on the chart at the bottom of the bracket E, this was at about 11:49½, indicating a delay at the crossing of approximately 6½ minutes. The other brackets on the chart indicate delays of various durations to other cars at this crossing.

When these charts are checked in the office, a template is used to simplify reading, and the long delays are picked off quickly by a clerk. These delays are then made up in the form of a report and are brought to the attention of the offending railroad companies.

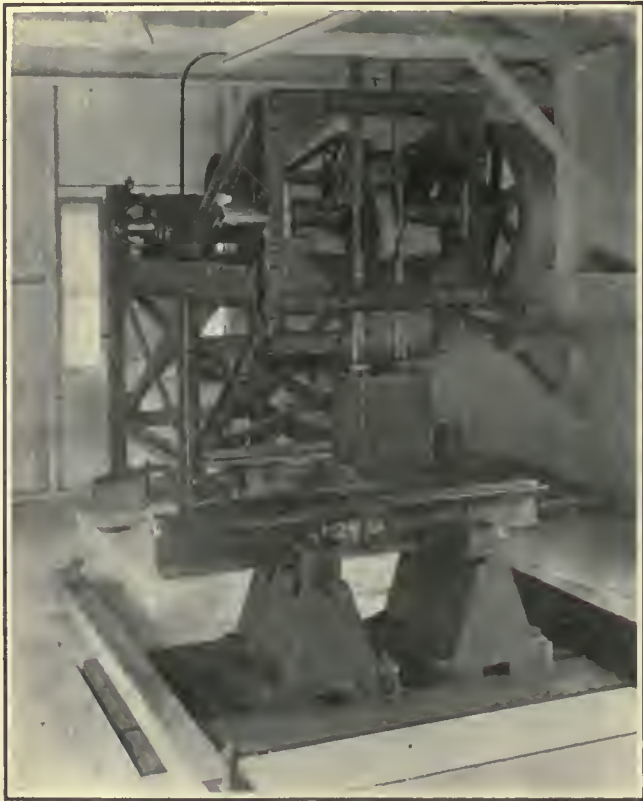


Steam Railroad Crossing Delays Are Shown on This Chart
Made by a Nachod Headway Recorder

Repeated Impact Tests Are Progressing

FOR some time past, a repeated impact testing machine has been at work under the auspices of the committee on welded rail joints of the American Electric Railway Engineering Association and the American Welding Society, making tests of various types of rail joints at the Bureau of Standards, on Connecticut Avenue, Washington, D. C. Bending drop and tensile tests of joints specially prepared by various way engineers throughout the country have already been made, as told in previous articles in this paper. Similar joints are now being tested in the repeated impact machine.

This apparatus consists essentially of a 400-lb. weight which drops a distance of 6 in. onto the rail joint. In conducting the test it has been the practice to have



In Making Repeated Impact Tests This 400-Lb. Weight Is Dropped 70 Times per Minute on the Rail Joint 6 In. Below

the weight strike about 2 in. away from the rail joint, simulating the condition that exists with a low joint in track. This weight is raised and dropped 65 to 75 times a minute. The joint itself rests on two supports about 22 in. apart, which are bolted down to a heavy cast-iron platform or anvil supported by springs. Special devices dampen the vibrations of the springs so that the anvil comes to rest between blows. The anvil weighs about 16,000 lb. and this mass is so great that the exact arrangement of springs underneath is immaterial, because the force of the blow is almost entirely dissipated before it reaches the spring.

No definite relationship has been established between the number of blows of the machine required to cause failure of a joint and the number of car passes which the same joint would stand. Inasmuch as many joints have failed in these experiments at between 150,000 and 200,000 blows, it is evident that the blow of the machine is more severe than that which would ordinarily be

encountered in actual service except with seriously defective joints such as are simulated by the machine. When designing the machine to determine how great the blow is with a low joint, lead inserts were installed in track actually in service and the compression caused by the passage of a car was measured. Experiments showed that a force of approximately 200 ft.-lb. was necessary to cause this amount of compression, and this force was therefore used in the testing machine.

Definite conclusions from the repeated impact experiments are not yet possible because the joints so far tested have been of two types only. Experiments are being carried out under the direction of Prof. H. L. Whittemore of the Bureau of Standards. Approximately one-fifth of the total number of joints have already been tested. It is hoped that by the end of the summer the tests will have been completed and the results will be available for publication to the electric railway industry.

Honor Roll Reduces Accidents in Dayton

THE City Railway of Dayton, Ohio, has established an honor roll among platform employees for freedom from accidents. In order to offer some form of reward for honor roll membership, each man whose name is put on the coveted list is given one day off a month with pay.

As now practiced, the rules call for freedom from accidents due in any form to the operator's negligence, where the company would be liable for injury or damage to property. When an operator has a clear record for a period of 3 months his name goes on the honor roll and he is entitled to one day off with pay, provided that he has worked at least 20 days during the month. After a man's name is once put on the list it stays there as long as he continues to be free of chargeable accidents. The names of approximately 80 per cent to 90 per cent of all platform employees are on the list each month.

At the end of December, 1924, 44 platform employees out of a total of approximately 110 were found to be free of chargeable accidents for the entire year. These men were surprised with a cash bonus of \$25 at

COMPARATIVE ACCIDENT FIGURES FOR DECEMBER, 1924, CITY RAILWAY OF DAYTON, OHIO

Division	Number of Accidents Chargeable	Other	Figures per Chargeable Passengers	Accident Car-Miles
First.....	1	23	569,221	67,408.4
Second.....	4	18	152,639	16,729.4
Third.....	0	24	407,566*	46,425.9*
Fourth.....	1	21	368,956	50,689.1

* Total figures. Ratio infinite.

Christmas time as a reward for the unusual care exercised in their work.

Another feature of the accident prevention work of the company is an honorary banner which is hung in the division having the best record at the end of each month from the standpoint of accident prevention. This banner is highly prized and results in each man being held personally responsible by his co-workers for accidents that affect the standing of the various divisions.

The accompanying table gives a comparison of accidents for each of the four divisions during the month of December, 1924.

Mayor Hylan Held Responsible for New York's Subway Ills

Governor Smith's Special Commission Criticises Board of Estimate, but Exonerates Members of New York Transit Commission—Urges Completion of Existing Lines with Shop and Yard Facilities—Demand for Larger Borrowing Capacity for City Approved

THE members of the New York Transit Commission are not chargeable with the failure to build the much needed new subway lines or extend the existing subways. The repeated and persistent refusals of the Mayor and other members of the Board of Estimate of New York City to adopt proposals for the validation of new routes and to approve contracts for construction of routes already validated or provided for in the dual contracts of 1913 completely frustrated provision for increased transit facilities. The charges made by the Mayor and the Board of Estimate against the commission are without foundation and no cause exists for the removal of the commissioners from office.

These are the principal findings made public on Feb. 9 by Justice John V. McAvoy, appointed by Governor Smith to inquire into the transit situation in New York City. Each of the eleven counts is dismissed with a statement that sufficient evidence was not presented at the public hearings before the justice to sustain the charges. The justice reached his conclusions without qualification or equivocation. His report is a concise statement of fact without flourish or adornment. The justice has dismissed the question of fare as not involved in the controversy. He did say, however, that a statute could be agreed to between the Governor and the Legislature, which would provide that the rate of fare should be 7 cents on the rapid transit lines and that the first cent above 5 cents should be paid into the city treasury monthly and the remaining cent be impounded so that the operating companies would be prevented from receiving any greater return than a fixed amount.

The one point on which Justice McAvoy fails to sustain the views of the Transit Commissioners is in his recommendation for legislation to take away their power to modify contracts with the railroad companies without the consent of the city. The commission has announced that it would not seek to exercise this power except in connection with its proposed readjustment plan for the unification of the transit companies into a single system. Justice McAvoy indicates that he considers this plan impracticable at present and declares that the absence of a provision to give the city final authority as to the lines to be included in such a system constitutes an "insuperable barrier" to its adoption without considering

any of the other possible objections that might be raised.

As the justice sees it the pressing necessity of the transit situation "called for co-operation between the Transit Commission and the Board of Estimate, and the rejection of contracts without any assigned good reason or because of hostility to the Transit Commission, which under the law was the only body which could propose them, is indefensible. Obviously, it would only prevent the building of new subways which were needed so acutely."

Subway routes which must be rushed to completion and which should have been finished long ago, had there been co-operation instead of antagonism on the part of the Board of Estimate, include the 14th Street line, the Nassau-Broad Street line, extension of the Queensboro line, the Washington Heights line, and making the West Side subway north of 96th Street into a four-track route. More cars can be run in non-rush hours, Justice McAvoy states.

The justice reaches no conclusion as to whether or not the city's proposed independent subway system can be made self-supporting at present construction costs on a 5-cent fare.

Saying that the 5-cent fare in the existing subways is unalterably fixed by contracts, and that the fare in the proposed municipal subway is fixed by statute at the same rate for the first 3 years, Justice McAvoy holds that the 5-cent fare issue does not now arise and that no anticipatory conclusion should be reached in advance of an estimate of the probable results of the operation of the proposed new lines by the Board of Transportation.

Justice McAvoy declares that the present municipally supervised system of bus operation is illegal and asserts that the city should compel the present individual bus operators to apply for franchises and certificates, with payment of a percentage of their receipts to the city, until the power of the municipality to operate buses is established by decision of the courts or by new legislation.

He also condemns the proposed Staten Island combined freight and passenger tunnel favored by the Hylan administration, and declares that the plans should be changed at once to a rapid transit tunnel, which can be built at much less cost, and that the present mandatory act for the construction of a combined freight and passenger tunnel should be amended.

From the *New York World*

THE findings are a detailed and unqualified condemnation of the Mayor's whole transit record. Unless Governor Smith rejects them the Democracy of New York cannot consider any longer the renomination of John F. Hylan.

To renominate Mayor Hylan would be to indorse him. To indorse him would be to make the whole Democratic party responsible for the indefensible record of the Hylan-Hearst faction. There is no escape from this conclusion. It is the very heart of the McAvoy report. With this report in existence, the Democratic party of New York must either dissociate itself entirely from the Hylan record or surrender body and soul to Hylan and Hearst and go down with them. There can be no compromise on a record that is indefensible.

The independent citizens of New York realize that a Democratic Governor would never have risked the dangers to his party contained in this inquiry if the evidence were not overwhelming and beyond dispute. This is no Republican report about a Democrat. This is no "reformer's" report about a "politician." This is the report of a Tammany judge to a Tammany Governor about a Mayor of their own party.

One point upon which Justice McAvoy sustains a contention of the city administration is his declaration for a constitutional amendment to exempt sufficient sums from the city's debt limit to provide funds for new subway construction. This, however, is the suggestion made by Comptroller Craig and not that of Mayor Hylan.

These suggestions are incidental. The main purpose of the report was to fix responsibility. The full report would cover 10 pages of space in the *ELECTRIC RAILWAY JOURNAL*. The attempt made here is merely to touch the high spots so far as these suggestions are contained. The justice's review and decision on the 11 allegations have been summarized as follows:

Charge 1

The first charge is substantially to the effect that the commissioners failed and neglected to perform their duty with respect to securing safe and adequate rapid transit services; in particular it is claimed that an accident happened on the elevated railroad in Brooklyn whereby two wooden cars fell to the street; that portions of the structure, in particular the guard rails and wooden ties, were defective and bolts were loose; that a device termed "dead man's button" was not installed upon the trains of that company; that under contract No. 4, wooden cars should not have been allowed to be used in trains operated upon that structure; that on July 30, 1924, a wreck occurred at the Sunnyside yard of the Long Island Railroad through the throwing by hand of a switch under a moving train, causing the derailment of the last three cars of the train; that on August 5, 1924, a wreck occurred at the Ocean Parkway station of the Brighton Beach line of the B.-M. T. system, and that the transit commissioners were guilty of negligence.

THE ANSWER

In support of this charge the Mayor's counsel urges that the transit commissioners, though in office from April 26, 1921, did not commence any public hearings into the service upon the rapid transit lines, until March 15, 1922, and that no order affecting that service was made until May and July of that year. The Transit Commission, however, did undertake the investigation of the service in November, 1921, preliminary to instituting the public hearings mentioned by the Mayor's counsel. It does not appear to me that there was any delay in making the inquiry which can fairly be criticised as amounting to a dereliction of duty.

The powers of the Transit Commission were regulatory in character, but that does not mean that the commissioners are chargeable with knowledge of each and every detail of the structure and equipment of the companies operating in this city. . . . I am certain that they were not guilty of misconduct because they did not at an earlier date take the steps now urged by counsel. Upon receipt of the report of the joint board of engineers in January, 1924, as to the condition of the elevated structure in Brooklyn steps were taken to carry out the recommendations of that report.

It is erroneous to say that the structure of any of the elevated railroads in Brooklyn was found by these engineers to be "unsafe." The converse is the fact. It would indeed be surprising if structures which have borne their burden for so many years had been found to be unsafe for use. Moreover, if the city authorities had or have evidence proving that the structure was

and is actually unsafe steps could have been and can still be taken by them through application to the courts to require its abatement as a public nuisance.

The accident on the Fifth Avenue line did not occur on a curve and seems to have been caused by the dropping upon the track of some portion of the car equipment, which caused a derailment, and it is difficult to see in what respect the most approved "dead man's

From the *New York Herald-Tribune*

THIS report is not the work of the political enemies of the Mayor. It was written after a searching examination into the cold facts by a man belonging to Mr. Hylan's own political organization, who happens to possess the honesty and the intelligence to subordinate party interests to public service. It is a pitiless and an unanswerable indictment of the Mayor's colossal failure to do the job which he promised to do in two campaigns and which the voters elected him to do.

The report is calm and dispassionate. It displays a thorough familiarity with every detail of the vast mass of testimony and exhibits submitted at the investigation, supplemented by a first-hand investigation of subway conditions.

Mr. Hylan's utter unfitness for the job which he has held for 7 years and which he hopes to hold for 4 years more stands revealed. A Governor of his own party accorded him the hearing of his charges against the Transit Commission that he so loudly demanded. A distinguished justice of his own party conducted the investigation, acquitted the Transit Commission, and fixed the responsibility for keeping the people out of subways on Mr. Hylan himself. Judge McAvoy's report ought to bring the Mayor's political career to an end.

button" would have averted that accident.

The accident in the Sunnyside yard resulted from the negligent conduct of an employee in turning a switch while a train was passing in front of him upon the track. The criticism is made that this switch should have been included in the interlocking system. There is no justification for the contention that the transit commissioners were charged with the responsibility of investigating every switch in every railroad yard to see whether it is properly controlled, in the absence of proof, as here, that the defect was one which was readily apparent or had been called to their attention.

The further contention that under contract No. 4 the wooden cars were required to be retired from service at the dates fixed in the schedule mentioned in Article XLVII of that contract, appears from a study of the contract to be fallacious. From the evidence before me it appears that these cars and their equipment were being maintained by the operating company in a serviceable condition by renewals and repairs, so that while for valuation purposes they might as a matter of contract stipulation be agreed to be worthless, when the city should exercise its right of recapture prior to the termination of the contract, nevertheless, if so maintained in good order there appears to be no reason why they should be scrapped unless all wooden car equipment is to be removed from operation. The retirement of these serviceable cars would not have aided in reducing, but would have necessarily tended to increase the congestion, due to the heavy traffic upon those lines.

Charge 2

The second charge condemns the transit commissioners for approving the reorganization of the Brooklyn Rapid Transit Company.

THE ANSWER

It is claimed that the Transit Commission, in the performance of its quasi-judicial function, approved a reorganization which it should have disapproved. The city of New York, although it took part in that proceeding, having been represented by counsel who called witnesses and presented arguments in support of its contention, did not seek to review its decision in the courts. It abided by the result. The organization was achieved. Now it criticises the determination of the Transit Commission upon the ground among others that the Transit Commission permitted an overcapitalization of the Brooklyn-Manhattan Transit Corporation because that company issued 769,911 shares of non-par value common stock.

The charge is made that after the approval by the Transit Commission, the Brooklyn-Manhattan Transit Corporation, which had been organized under the business corporation laws of the state of New York, entered upon its books the sum of \$40,000,000 as the valuation of the 769,911 shares of non-par value common stock. It does not appear that the Transit Commission had any jurisdiction over the book entries of the Brooklyn-Manhattan Transit Corporation, after it approved the form of capitalization which had theretofore been approved by the United States District Court.

The prices at which the shares of that company sold in the market were not matters which fell within the scope of the Transit Commission's jur-

isdiction, nor will the declaration of a dividend by the corporation, organized under the business corporation law, come under the Transit Commission's control.

The courts have ruled that the legislation giving public utility commissioners power to regulate the issuance of stocks and bonds of a public utility corporation was not designed to make the commissioners financial managers of the corporation, nor did it empower them to substitute their judgment for that of the board of directors or stockholders of the corporation as to the wisdom of a transaction.

Nothing has appeared to indicate that the Transit Commission did not bring to the matter the exercise of its discretion in good faith under the law.

Charge 3

The third charge embodies a claim that the Transit Commission was negligent in failing to require the operation of sufficient railroad cars and adequate train crews and their equipment by the companies operating under contracts Nos. 3 and 4, and that as a result the traveling public, especially during the rush hours, received inadequate and insufficient accommodation and were crowded into the cars beyond their capacity.

THE ANSWER

That there is and has been an intolerable overcrowding of passengers, both upon the stations and upon the cars of the operating companies, is of course admitted by everyone. That the companies appear to be operating substantially all of the trains which could with safety be accommodated on existing lines during the so-called rush hours was conceded by the Mayor in the written memorandum which he submitted upon the hearing. There are points of congestion upon the trunk lines through which no more trains can be safely operated during the rush hours, and naturally the outlying districts through which these rush-hour trains are distributed suffer from an inadequate number of trains. Obviously this situation could have been alleviated by the employment of more cars, provided the inspection and shop facilities had been adequate for the proper maintenance of a greater number of cars than were in service. With the completion of all the required shop and inspection facilities additional cars ought to be required. There is no evidence tending to show that the transit commissioners have been neglectful of their duty in this respect.

Charges 4 and 5

Charges 4 and 5 may be grouped, inasmuch as both relate to the alleged failure of the commission to enforce the provisions of the dual contracts with respect to depreciation.

THE ANSWER

Contract No. 3 provides that from the pooled revenue there shall annually be deducted 12 per centum thereof to provide for maintenance, exclusive of depreciation. It is then further provided that for the first year of operation under the lease 5 per centum of the revenue shall be placed in a depreciation fund, and that annually, within

30 days after the 30th day of June, the commission and the lessee shall determine the amount to be paid to such fund and the classification thereof.

The precise meaning of the language of these provisions in the contract is in dispute. The city, through the Transit Commission, contends that in addition to the 12 per cent provided in

From the New York Times

THE sweeping condemnation of the Mayor's course is the thing which to most eyes will stand out in Judge McAvoy's report as of chief importance. Judge McAvoy asks nobody to take his word for this. He recites and analyzes the evidence. He traces the Mayor's vacillation and obstruction step by step; showing what contracts were violated, what promises were repudiated, what official undertakings were concealed, even what orders of the court were defied. The result is a terrible arraignment, all the more death-dealing for being couched in judicial and restrained language. The whole report is, in fact, a model. It is clear without being wordy, condensed without being obscure, and marches from premises to conclusion with an irresistible sweep of logic.

The report is not an indiscriminate defense of everything that has been done by the operating companies or even by the Transit Commission. The judge thinks that the Transit Commission should have insisted upon better sanitary conditions in the subway and elevated stations. He objects to permitting the companies to cut down too sharply the force of guards on the trains. There are other minor improvements which should have been required. But all these things are only trifles compared with the way in which Mayor Hylan has thrown himself athwart rapid transit progress.

Judge McAvoy embodies in his report a constructive subway program. Its details, most of them admirable, must be left for future discussion. The great thing is that we have at last a judicial determination in regard to scandalous acts of the city administration which have too long afflicted us. The report certainly ought to be the beginning of better days for rapid transit relief. It ought also to be, if there is left in New York anything like a reasoning public, the end of Mayor Hylan politically.

paragraph 4 and such further sums as may be necessary to maintain the equipment, which sums have been denominated "excess maintenance," there is an obligation upon the company to take further sums from the annual revenue and place them in a depreciation fund. The company, on the other hand, contends that it has fully maintained the equipment and that there has been in fact no depreciation and therefore no necessity for payments due to any depreciation fund.

The Transit Commission has steadfastly adhered to the city's view of

the proper construction of these provisions of contract No. 3, but has under the advice of its counsel deemed it inexpedient to press the matter to a determination at this time. The commission has not waived the city's rights, but has apparently fairly exercised its judgment and discretion, and there is nothing in its conduct which would justify the charge of malfeasance.

Charge 6

The sixth charge is to the effect that the commissioners have not compelled the operating companies, under contracts Nos. 3 and 4, to put into the pool all the revenues derived, directly or indirectly, from the operation of the properties.

THE ANSWER

The items, specifically referred to, are sums received as rentals from cars leased to other corporations, share of joint revenues with other companies and the amounts received from interest on bank balances. It appears that the first of these items has been adjusted, and the company has acceded to the city's contention as maintained by the Transit Commission. The other two items are in course of adjustment, and the Transit Commission has steadfastly maintained the city's contention with respect thereto.

Charge 7

The seventh charge relates to the inclusion of the receivership expenses in cost of operation, under the provisions of contract No. 4, and further asserts that the transit commissioners have failed to provide adequate examination of the operating accounts of the lessees, and have failed to exclude from the cost of operation items of expense said to be improperly charged against operation under contracts Nos. 3 and 4.

THE ANSWER

The evidence shows that a fraction of the total amount of these expenses, consisting mainly of the compensation of the receiver and his counsel, were permitted to be charged against the cost of operation, being a sum about equal to what would have been the salaries of the officials of the companies, had there been no receiver. The accounting department of the Transit Commission is well organized and has performed its duties in connection with the examination of accounts.

Charge 8

The eighth charge relates to the action of the Transit Commission with respect to items in the 12th and 19th quarterly determination of costs by the engineers under contract No. 4, and the claim likewise that the Transit Commission has failed to urge objections made by its predecessor and to cause the removal of unwarranted items charged thereunder.

THE ANSWER

When the Transit Commission came into office, the disposition of these matters was 5 years in arrears, and within 9 months they were brought up to date. Subsequent determinations have been made from time to time, as appears from the volumes relating thereto, which have been introduced in evidence

before me. There is no ground for believing that the Transit Commission has been derelict in its duty in this respect.

Charge 9

The ninth charge consists of the claim that the transit commissioners have violated their duties by creating and maintaining useless appointees in office, who were unfit for the work imposed upon them.

THE ANSWER

The Transit Commission continued to employ those who had been performing similar duties under its predecessors. Nearly all of these positions were in the classified Civil Service. The only person mentioned by the Mayor as being unfit was called before me and I found him to be a competent man who was performing his duties. A comparison of the amount expended by the Transit

Commission, with that now being incurred by the two bodies, covering the entire field, with which the Transit Commission was invested under the law, prior to July 1, 1924, shows that the expenditures of the Transit Commission were less than that of the two bodies now doing the same work.

Charge 10

The tenth charge accuses the transit commissioners of failing to restore the unified service which existed prior to the receivership of the railroad companies in New York and Brooklyn, and refers in particular to the fact that the Brooklyn City Railroad is being operated independently of the B.-M. T. system of which it was formerly a part.

THE ANSWER

That railroad company became a separate unit during the B. R. T. receiver-

ship by virtue of a court order, and manifestly the Transit Commission could not as a matter of law fail to regard the determination of the United States District Court in that respect. There is no reason to believe that the transit commissioners did not act in entire good faith in connection with its consideration of this matter and there is no warrant for any finding of neglect or malfeasance.

Charge 11

The eleventh charge relates to the alleged failure to retire the wooden cars in accordance with the provisions of contract No. 4.

THE ANSWER

This charge is substantially included in the first charge and is disposed of by the views expressed by me with respect thereto.

Boston Begins Educational Program

Eight Hundred Elevated Railway Employees Meet Regularly Under "Departmental Group Conference Plan" Devised to Help Ambitious Workers Secure Best Information Available in Their Specialties—Power, Transportation, Maintenance, Shop Practice and Special Subjects for Women Included

THIS winter there is being carried out on the property of the Boston Elevated Railway a comprehensive educational program under what, for want of a shorter term, is known as a "departmental group conference plan." Five groups are holding meetings, practically each week, as follows: Rolling stock and shops; maintenance (track, elevated structures, subways, buildings, signals, etc.); power; transportation, and women of several departments. Upward of 800 employees are registered in these groups and a high percentage of attendance is being maintained.

The first step in preparing the present program was to consult a large number of representative employees who had taken courses in previous years. The unanimous desire was for an opportunity to discuss departmental problems and the principles underlying the work of the several departments.

Next, the general manager, Edward Dana, in consultation with department heads, appointed a committee on education for the property. This consists of men selected by the department heads to act as group chairmen, with the general manager as chairman of the educational committee. To the educational committee was assigned the task of preparing a program for the season. The committee asked each departmental representative to prepare a list of topics for a maximum of 20 meetings, and to plan to secure speakers to present these topics and lead the discussions. In this work the committee was assisted by Henry H. Norris of the McGraw-Hill Company staff. The schedule, as approved by the committee, is shown in the accompanying table.

The meetings, in general, are held in a large and well-equipped instruction school recently completed at the Sullivan Square terminal in Charlestown. Here there is seating capacity up to 700 persons, and the main auditorium is provided with motion and still picture projection apparatus, sound amplifiers of the latest

type, radio, piano—in short, everything needed for the comfort, convenience and entertainment of the groups.

The program of each meeting is designed to run from 7:30 to 9 p.m.; a half hour each for the informal talk or series of talks, for the discussion, and for such other features as may be provided.* This is subject to frequent modifications to take advantage of the presence of visiting electric railway men or company officials. The talks are given by experts from the railway's staff or by outsiders, with such illustrations as the subject permits. Motion pictures and stereopticon slides are freely used. At some meetings entertainment features, such as group and solo singing, educational and humorous motion pictures and radio selections, are introduced by the group leaders.

LECTURE OUTLINES DISTRIBUTED IN ADVANCE

Men who accept invitations to address the groups are asked to furnish outlines of their talks at least two weeks before the meetings. These are mimeographed and distributed in advance, to serve as reminders of the dates and to assist in formulating questions for discussion. The outlines for each group will serve as a syllabus of the series. Where full manuscripts are prepared in advance by the speakers, they are filed with the railway librarian for subsequent binding. Condensed records of the discussion are also made for the same purpose, and to insure attention to the suggestions for service improvement which are brought out. Attendance at the meetings is recorded on individual cards, printed in a different color for each group. Group members are also provided with pocket cards containing the meeting schedules, each printed on stock of the same color as the group record cards.

*The power group conferences, which are administered by the Massachusetts Department of Education, follow a modified plan, as explained in the schedule on page 257.

Five joint meetings, under the direction of the general manager, form part of the winter's program, and bring the five groups together. The first was held in November, with the editor of the *Boston Evening Transcript* as the principal speaker. One-minute reports were made by a score or more men who had represented the railway at the American Electric Railway Association convention or the National Safety Congress. At other general meetings prominent city officials and railway managers will speak.

The group conferences have already produced several by-products, notably a series of "talks" on accident prevention by the claim department staff. (See *ELECTRIC RAILWAY JOURNAL*, Jan. 31, 1925, page 185.) A joint committee from the auditing and maintenance departments, appointed to consider ways of minimizing stocks of stores, is a very recent development.

One lesson which the planning of this program showed early was that a uniform scheme could not be devised to fit all departments. For example, the power department found its needs best met by courses of lectures delivered by experts from outside the staff. Two series of 10 lectures each were arranged, one covering mechanical engineering, the other electrical engineering. The maintenance department divided its topics among its several sub-departments, with attendance optional to men not directly interested in a topic under discussion. The interest has been so great, however, that few men have been willing to miss any of the meetings. The transportation conferences are held in two sections, one in the morning for night men, the

other in the evening for day men. The rolling stock group expected to hold some of its meetings at the Everett shops, but the large registration interfered. The women's group found it desirable, to insure sustained interest, to limit the list of topics to the 10 most essential for a general understanding of local railway operating methods. The women have shown an intense interest, with an enrollment, as in the other groups, much larger than expected.

The management of the Boston Elevated Railway does not regard the "departmental group conference plan" as an ultimate educational program. It lacks the home study element; but it has great instructional value and is stimulating. Moreover, it forms an excellent foundation for later study by those who desire such.

Its development on a large scale on the Boston Elevated illustrates the interest of the public trustees and the general manager in industrial education. One of the trustees, J. Frank O'Hare, is a trustee of the Franklin Union, a thriving vocational school founded on a bequest made to Boston by Benjamin Franklin. Mr. Dana is chairman of the committee on education of the American Electric Railway Association.

The railway's present educational activity began 3 years ago, when arrangements for instruction of a large group in practical electricity were made with the Massachusetts Department of Education. This was followed by other electrical courses and by one on public utility economics, delivered by L. R. Nash of Stone & Webster. The group conferences form the third stage in this educational development.

Schedule of Meetings of Departmental Group Conferences Boston Elevated Railway

Season of 1924-1925

GENERAL MEETINGS—Nov. 12, 1924; Feb. 9, March 27, April 15, May 13, 1925

Women's Group

Meets at 7:30 p.m.

1924

- Nov. 17. Auditing.
- Dec. 1. Purchasing.
- 8. Track.
- 15. Training transportation employees.

1925

- Jan. 12. Power.
- 19. Schedules.
- 26. Snow.
- Feb. 2. Accidents.
- 16. Car operation.
- March 2. The "Elevated" problem as a whole (Mr. Dana).

Power Department Group

Power Department Group Conferences are under the direction of the Massachusetts Department of Education, Division of University Extension, and meetings are held on Thursdays at 7 p.m., as scheduled.

The power department group is considering the following topics: Modern boiler practice; fuels and firing; combustion; fundamental principles of steam turbines; general features of turbine construction; development and operation of steam turbines; auxiliaries in high-vacuum turbine plants; steam—its properties and generation; economy as affected by power-plant operation; electrical generation—with reference to the construction and operation of generators, switchboards and meters; transmission—including oil circuit-breakers, protective devices, auto transformers and the advantages of high voltages; substations—manual and automatic operation, storage batteries, transformers, rotary converters, and protective relays; distribution—typical overhead and underground feeder system, together with switchboards, high-speed and air circuit-breakers, and cable testing; motors and controllers—direct-

current apparatus including car equipment, shunt and compound motors, hand and automatic control equipment, alternating current apparatus, including single-phase, polyphase and synchronous motors and starting compensators.

Transportation Department Group

Meets at 10:30 a.m. and 7:30 p.m.

1924

- Nov. 7. Accident prevention.
- 21. Accident reports.
- Dec. 5. Employment and instruction of new men.
- 12. Relations with employees.
- 19. Selection and training of sub-officials.

1925

- Jan. 16. Treatment of passengers.
- 23. Complaints against employees.
- 30. Relation of maintenance to transportation.
- Feb. 6. Power saving.
- 20. Carhouses and stations.
- 27. Cars and equipment.
- March 6. Complaints against service and equipment.
- 13. Revenue accounting.
- 20. Handling of passengers off cars.
- April 3. Traffic surveys and time-tables.
- 10. Dispatching and maintaining schedules.

Maintenance Department Group

Meets at 7:30 p.m.

1924

- Nov. 4. Introductory meeting.
- 18. Practices in Cleveland, Ohio.
- Dec. 2. Development of rapid transit in Boston.
- 9. Railway signaling.
- 16. Stores—accounting.

1925

- Jan. 13. Manufacture of steel.
- 27. Accident prevention.
- Feb. 3. Ordering and distribution of materials and equipment.
- 17. Erection of Boston Army Base.
- 24. Heat treatment of metals.
- March 3. Stores—purchasing materials.
- 10. Uses of laboratory in preparing specifications and checking materials.
- 31. Welding and cutting of metals.
- April 7. Maintenance of power circuits.
- 21. Relation of maintenance department to public officials and labor organizations.

Rolling Stock and Shops Group

Meets at 7:30 p.m.

1924

- Nov. 5. Car construction, specifications, contracts, etc.
- 19. Car construction, review of designs.
- Dec. 3. Car-body repairs.
- 10. Car-body painting.
- 17. Trucks—general principles and design.

1925

- Jan. 14. Truck maintenance, wheels, axles, brakes, etc.
- 21. Railway motors—general principles and design.
- 28. Railway motors—service requirements, etc.
- Feb. 4. Railway motors—maintenance.
- 18. Control equipment—principles and design.
- 25. Control equipment—multiple-unit.
- March 4. Control maintenance.
- 18. Air brakes—principles and design.
- 25. Air brakes—maintenance.
- April 1. Shop practices and handling stores.
- 8. General review.

Repair Shops Keep Busy

THE Department of Commerce announces that, according to the data collected at the biennial census of manufactures for 1923, the repair shops of steam and electric railroad companies reported work done during that year to the aggregate value of \$1,520,902,751, an increase of 19.9 per cent as compared with 1921, the

STATISTICS FOR ELECTRIC RAILROAD REPAIR SHOPS, 1923 AND 1921				
	1923	1921	Per Cent of Increase or Decrease (a)	
Number of establishments.....	547	560	-2.3	
Wage earners, average number (b).....	34,925	33,279	4.9	
Minimum month.....	Nov. 35,492	Jan. 33,985		
Maximum month.....	Aug. 34,250	Nov. 32,571		
Per cent of maximum.....	96.5	95.8		
Wages.....	\$49,225,583	\$48,775,235	3.0	
Cost of materials.....	\$31,981,650	\$33,560,133	-4.7	
Paid for contract work.....	\$110,949	\$105,862	4.8	
Value added by manufacture (c).....	\$54,430,995	\$53,752,293	1.3	
Horsepower.....	62,360	(d)		
Coal consumed (tons of 2,000 lb.).....	135,216	(d)		
Total value of work or products.....	\$86,412,645	\$87,312,426	-1.0	
Motive power and machinery departments, value.....	\$7,303,972	\$7,715,044	-5.3	
Electric locomotives built:				
Number.....	17	(d)		
Value.....	\$198,775	(d)		
Repairs to motors, etc., value.....	\$6,692,410	\$7,226,905	-7.4	
Work for other corporations, value.....	\$101,754	\$78,472	29.7	
All other work or products, value.....	\$311,039	\$409,667	-24.1	
Car departments, value.....	\$75,070,768	\$75,529,519	-0.6	
Cars built, value.....	\$3,523,648	\$1,248,267	182.3	
Passenger:				
Number.....	299	127	135.4	
Value.....	\$3,287,447	\$822,398	299.	
Freight:				
Number.....	47	2	1,340.8	
Value.....	\$103,738	\$7,200		
Other:				
Number.....	37	48		
Value.....	\$132,463	\$418,669	-68.4	
Repairs to cars of all kinds, value.....	\$65,420,854	\$69,131,546	-5.4	
Work for other corporations, value.....	\$1,486,380	\$1,249,497	19.0	
All other work or products, value.....	\$4,639,886	\$3,900,209	19.0	
Bridge and building departments (shop work only), value.....	\$438,624	\$516,942	-15.2	
Repairs and renewals, value.....	\$434,590	\$420,445	3.4	
All other work or products, value.....	\$4,034	\$96,497	-95.8	
All other work or products, not classified, value.....	\$3,599,275	\$3,550,921	1.4	

(a) A minus (—) sign denotes decrease. Per cent omitted where base is less than 100.
(b) Not including salaried officers and employees nor proprietors and firm members. Statistics for these classes will be given in final report.
(c) Value of products less cost of materials.
(d) Not reported.

last preceding census year. For steam railroad repair shops alone the total was \$1,433,680,106, an increase of 21.5 per cent as compared with 1921, and for electric railroad repair shops it was \$86,412,645, a decrease of 1 per cent.

Details of the statistics on electric railway repair shops appear in the accompanying table.

Measuring Rail Deflections Under Load

INTERESTING experiments are being conducted on the lines of the Capital Traction Company, Washington, D. C., with a machine just developed by the Bureau of Standards, to measure the deflections of rail in paved streets caused by the passage of cars. This is being done jointly by the engineering staff of the company named and that of the Washington Railway & Electric Company. Measurement is not made of the actual deflection distances, but the comparative deflections under different conditions of service are obtained. Tests have been made with cars of different weights and having various types of truck. It is planned also to study the effect of flat wheels passing over the instrument.

In making these tests an aluminum bar, about 8 in. long and provided with two contact points, is placed on the base of the rail in contact therewith. One contact point is a part of the aluminum bar, while the other is

attached to a hinged arm. Movement of this second contact and its connecting arm causes the compression of carbon particles contained within the bar, and this varies the resistance of the electric circuit.

This circuit is one arm of a wheatstone bridge, the other arms of which are housed in a portable box. A mirror carried on the galvanometer of the wheatstone bridge reflects a beam of light on a photographic film, which is moved at a predetermined rate by a small electric motor. Similar bars are placed on the head of the rail and in the center of the web.

After a small amount of pavement alongside the rail has been removed, the bars are placed in contact with the rail. The box containing the rest of the apparatus is carried on a small motor truck which stands near by in the street. When a car passes over the instrument the deflection of the rail is recorded in the shape of curves on the photographic film. Tests will be made at joints and also in the center of the rail. At present experiments have not been carried far enough to permit reaching definite conclusions. After several types of rail have been tested under different conditions of service, it is expected that the curves will furnish information valuable for study in connection with rail and car design.

Capital Traction Has 25 per Cent
10-Year Men

FIGURES just compiled by the Capital Traction Company, Washington, D. C., show that at the beginning of the present year more than 25 per cent of its employees had been in service for 10 years or longer. One man who first went to work for the company in 1868 had a service record of 56 years. Another had 51 years. Altogether nearly 1 per cent of the total number of employees have had more than 40 years of service. About 5 per cent have had between 30 and

LENGTH OF SERVICE OF OFFICERS AND EMPLOYEES OF THE
CAPITAL TRACTION COMPANY

Year Employed	Number of Full Years Service	Number of Em- ployees	Per Cent	Year Employed	Number of Full Years Service	Number of Em- ployees	Per Cent
1868	56	1	0.8	1905	19	9	6.8
1873	51	1		1906	18	10	
1881	43	3		1907	17	18	
1883	41	3		1908	16	19	
1884	40	2	1.1	1909	15	24	6.9
1885	39	1		1910	14	9	
1886	38	3		1911	13	11	
1887	37	1		1912	12	28	
1888	36	4	3.8	1913	11	18	32.0
1889	35	4		1914	10	16	
1890	34	9		1915	9	10	
1891	33	7		1916	8	30	
1892	32	8	2.0	1917	7	82	30.3
1893	31	12		1918	6	134	
1894	30	8		1919	5	121	
1895	29	14		1920	4	111	12.5
1896	28	1	3.8	1921	3	77	
1897	27	3		1922	2	66	
1898	26	2		1923	1	104	
1899	25	4	100.0	1924	..	147	
1900	24	6					
1901	23	8					
1902	22	11					
1903	21	11					
1904	20	9					

40 years. Nearly 6 per cent have had between 20 and 30 years. Others over 10 years constituted 13.7 per cent. Listed among those with 30 years of service were J. H. Hanna, vice-president in charge of operation, and R. H. Dagleish, chief engineer. The number of employees and the length of their service is shown in the accompanying table.



Each Half of This Berlin Articulated Train Has Five Car Bodies and Six Trucks

German Railways Try Articulated Trains

Tests Are Being Made at Berlin and Hamburg—Each Unit of the Berlin 10-Car Train Has Five Car Bodies and Six Trucks—This Train Is Being Used in Rapid Transit Service—The Hamburg Unit with Two Car Bodies Is Used on a Single-Phase Electric Railway

THE advantages accompanying articulation of car bodies have attracted attention in Germany as well as in this country and England. In fact, the claim is made that in Germany the principle of car body articulation was developed in 1901, although it has been applied in actual practice only during the last two years. There are at present two German railway properties operating articulated cars. One of these and the first to put them in service is the Berlin Stadtbahn, a part of the German government railroad system which extends through the city of Berlin and does a large short-haul business. It is soon to be electrically equipped but is now running by steam.

On this road there is one articulated train in service. This is in two halves, each unit having five car bodies and six trucks. This train has been in regular service in Berlin since Aug. 17, 1923, being hauled by steam locomotives.

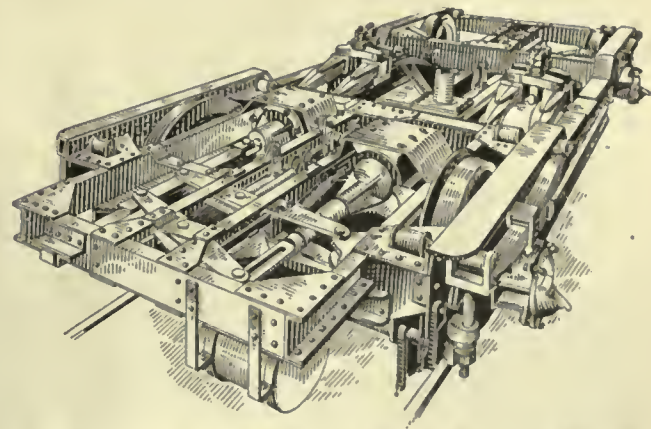
An article in *Glaser's Annalen* for July 1, 1924, from which the following particulars are taken, states that a speed of 63 m.p.h. has been attained without troublesome side sway and with no sluggishness in the springs. The main dimensions of the entire train (10 bodies and 12 trucks) are as follows:

DIMENSIONS OF BERLIN 10-CAR ARTICULATED TRAIN		
Length over all.....	140	m. (459 ft. 8 in.)
Distance between king pins.....	12.45	m. (40 ft. 10 in.)
Wheelbase of pilot truck.....	2.5	m. (8 ft. 2 in.)
Wheelbase of pivot trucks.....	3.5	m. (11 ft. 6 in.)
Length of middle car bodies.....	12.1	m. (39 ft. 9 in.)
Length of end car bodies.....	15.4	m. (50 ft. 7 in.)
Bulkhead clearance between middle car bodies.....	0.4	m. (15 in.)
Bulkhead clearance at end car body with the two halves coupled.....	1.3	m. (51 in.)
Wheel diameter of pilot trucks.....	1.0	m. (39 in.)
Wheel diameter of pivot trucks.....	0.85	m. (33 in.)
Weight of train.....	218.5	metric tons
Weight of like capacity train made up of motor cars on trucks and of trailers with ordinary running gear.....	226.6	metric tons

It is pointed out that an equivalent motor car would require a king-pin distance of 14 m. instead of the 12.45 m. on the articulated car. This difference permits the latter to be built 40 mm. (15½ in.) wider, thus reducing the gap between car and platform at stations along curved track. Without load the car floor is 1 m. (39.4 in.) above the head of the rails, but as the station platforms are 760 mm. (30 in.) high no intermediate car step is needed. Sliding side doors are used.

The pilot trucks at the outer ends of each unit are of the ordinary swiveling type and carry the motors. The pivot trucks are of special design and built under the Jakob patent. As shown in the drawing of this truck on page 261, the load is transmitted from the cylindrical king-pin *Z* through the brackets or bolster *D* to central semi-elliptic springs, thence to the side frames of the truck and through semi-elliptic springs to the journals.

King-pin guide blocks *K* are attached to the end sills *S* of adjacent car bodies, these guide blocks being of greater diameter than the king pin. The inclination of the car bodies toward one another in a perpendicular plane due to change of grade, bending of springs, etc.,



Inner Truck Used in Articulated Trains at Berlin and Hamburg

is so small that a slight bulge in the king pin suffices to take care of it.

The car bodies are allowed to slide on side bearings which are located as close to the king pin as possible. Any tendency of one car to sidesway is modified by the action of the spring system of the articulated truck common to adjacent cars. The conditions of train make-up do not call for passenger communication between cars, but if required it would cause less difficulty than on ordinary cars.

The wheelbase of the pivot trucks between bodies has been made long, thus offering another factor to give

smooth running. The manner of carrying the load places so little stress on the side frames that comparatively light members are possible, even in the present instance with a wheelbase for the articulated truck of 3.5 m. (11 ft. 6 in.). The longer springs, of course, are of further advantage. In spite of this long wheelbase, the truck, including a Kunze-Knorr Type B braking cylinder, weighs no more than the customary truck of 2.5 m. (8.2 ft.) wheelbase, exclusive of braking equipment.

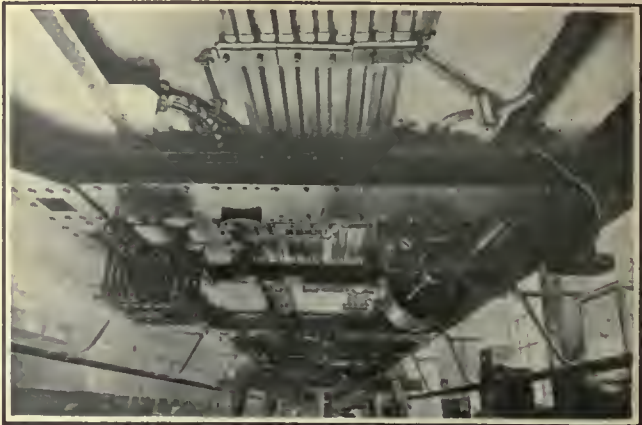
Although the articulated train described has a number of advantages, it is considered unlikely that it will become standard on the Stadtbahn. It was built on the assumption that with the line electrically equipped, the trains would consist of a mixture of motor and trail units and that four motors (two trucks) per half-train would serve. The latest plans, however, call for all motor-car units in order to secure maximum flexibility in variation in train length. This would double the number of motor trucks per train and so make the use of articulated trucks too costly.

HAMBURG IS TRYING DUPLEX MOTOR CAR

A second installation of an articulated train in Germany has been made on the Hamburg Stadt- und Vorortbahn, which is equipped with the single-phase system. This train, which has two bodies and three trucks, was supplied by the Gorlitz Car & Machine Company, which also built the Berlin unit. The forward truck of the articulated train is equipped with two motors, and the other trucks carry no motors.

The principal dimensions of the train are given in the accompanying table.

The forward car is divided into five third-class compartments, one baggage compartment and one service compartment. The second car has four second-class compartments, two third-class compartments, and one



Underside of the Hamburg Car Body Showing Bare Rectangular Conductors Used for Low-Voltage, Single-Phase Circuits

service compartment. There is no passageway between the cars. The pivot truck is of the Jakob type, similar to that under the Berlin train.

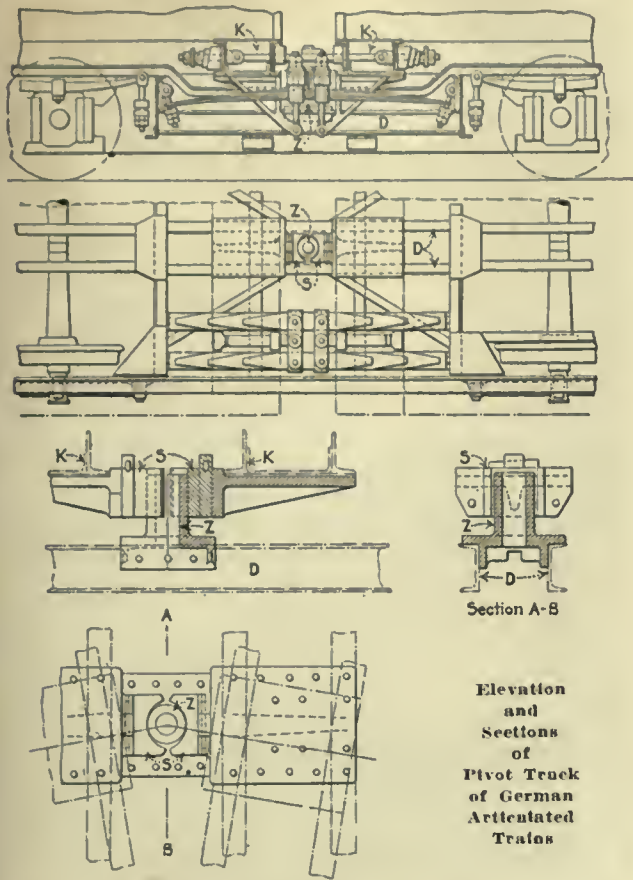
The electrical equipment includes two compressed-air bow-type current collectors which take 25-cycle, 6,000-volt, single-phase current to a transformer, having an hourly rating of 300 kva. and a continuous rating of 200 kva. The two Brown-Boveri motors have each a continuous rating of 320 hp. and an hourly rating of 410 hp. Multiple-unit control is employed, so that any

DIMENSIONS OF HAMBURG ARTICULATED UNIT

Length of each single car body.....	14,222 mm. (46 ft. 6 in.)
Total length of articulated unit over buffers.....	30,000 mm. (98 ft. 6 in.)
Weight of unit, with complete equipment.....	66,000 kg. (145,000 lb.)
Outside width of car body.....	2,550 mm. (8 ft. 4 in.)
Wheelbase of motor truck.....	2,500 mm. (8 ft. 2 in.)
Wheelbase of pivot truck.....	3,500 mm. (11 ft. 6 in.)
Wheelbase of rear truck.....	2,500 mm. (8 ft. 2 in.)
Diameter of wheels.....	1,000 mm. (3 ft. 3 in.)
Gage of wheels.....	1,435 mm. (4 ft. 8 in.)



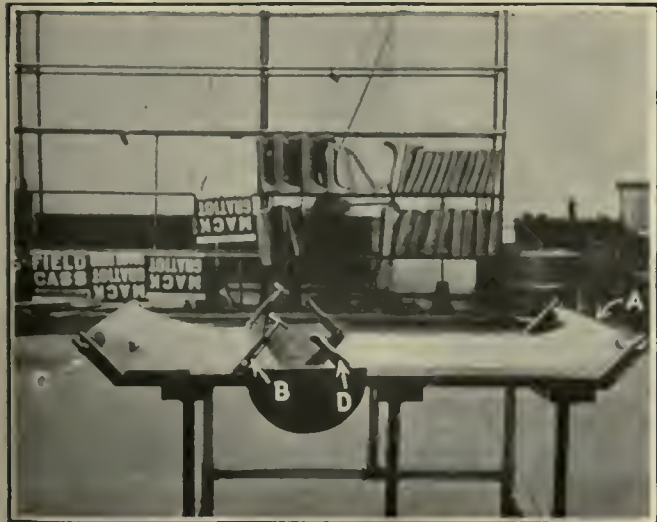
This Two-Car Articulated Train Is Used in Hamburg Suburban Service on the Single-Phase System



number of these double-end units can be operated together.

Instead of carrying the main low-voltage circuits in cable, use is made of bare conductors or busbars of 30x6 sq.mm. and 20x6 sq.mm. cross-section. They are carried from the underside of the car floor by means of wooden spacers and clamps. These bare conductors can be readily shifted and they are free from the arcing troubles possible from deteriorated cables.

An interesting feature of the heating is that the heaters are in circuit only when the controller is off, thus avoiding excessive peaks.



The forward car carries the motors and the transformer; the second car carries the compressor and a number of auxiliary devices. The compressor supplies air for brakes, current collectors and signals.

Silk Screen Sign Printing Used in Detroit

Special Equipment Built in Shops of Department of Street Railways Facilitates Work of Printing Route and Destination Signs for Maintenance

By H. S. WILLIAMS

Assistant Superintendent of Equipment, Department of Street Railways, City of Detroit, Mich.

PRODUCTION of sign rolls for transparent route and destination signs on electric cars has undergone radical improvement in the shops of the Department of Street Railways, City of Detroit.

It was noted a year ago that several large electric railways were still making sign curtains by the old, laborious process of hand lettering. On most properties, however, stencils are used. This necessitates some hand work, but is a marked step in advance of the hand-lettering method. About 2 years ago a new process was instituted, which eliminated all hand lettering, and reduced costs materially. This was the silk bolting cloth and opaque letter method.*

The sign-making process as now used in Detroit is an adaptation of the silk bolting cloth process. The first step is the preparation of the sign cloth. A high-grade shade cloth is used, and is given a preliminary treatment with fish oil to increase its transparency as well as to make it easy to clean. This is menhaden oil purchased according to Navy Department specification 52-0-6. The oil is mixed with gasoline in the proportion of one part fish oil and one part gasoline. This mixture is then placed in the semi-circular trough of the table shown in an accompanying illustration. A roll of curtain cloth, which is cut to correct width on a band saw, is then put on roller A, from which it is run

*The silk screen or silk bolting process as used in Brooklyn was described in the ELECTRIC RAILWAY JOURNAL for December 15, 1923, page 1007.—ED.



The Shade Cloth on Which Signs Are Printed is Treated in Advance with Fish Oil

As shown in the illustration at the left, the cloth mounted on roller A is passed through the bath of oil contained in the tank at the center of the table. Lever D connects with a weighted roller which holds the cloth down in the oil. B is a squeegee for wiping off the surplus oil as the cloth is wound up on roller C with a hand crank. The right hand illustration shows the treated cloth suspended for drying. The racks are arranged so that they can be lowered into a position handy for stringing the cloth.

under a weighted roller which holds it in the oil bath. Coming out of the bath, the cloth passes under an adjustable squeegee, *B*. This wipes off surplus oil as the cloth is wound on roller *C* with a hand crank. The weighted roller in the bath is provided with a handle, *D*, by which the roller can be lifted out of the way when a new roll of cloth is being started through the apparatus.

After the cloth has been treated with fish oil the roller *C* is lifted off its support and placed in a similar holder on the drying rack. The cloth is threaded over the bars of the drying rack, where it is left until dry as shown. This rack, as the illustration shows, is similar to a very wide ladder and is arranged on pulleys so that it may be lowered for convenient handling and then raised up out of the way where the cloth is suspended in the warmest zone of the room to hasten drying. Experience indicates that it takes about 72 hours properly to dry the material in this way. After that the cloth is transferred to another roll preparatory to the printing operation.

HOW STENCILING IS DONE

The next step concerns the type of stencil to be used. The stencils are made up in units 26 in. x 39 in. and contain five names each. They consist of substantial wood frames over which No. 10 silk bolting cloth is stretched. The letters are then applied to make the desired words. Here a change has been made from the customary silk cloth process. Instead of making the letters with opaque paint, they are cut out of paper and applied to the bolting cloth with shellac. Sharper edges on the letters result from this method in comparison with the use of opaque paint.

Each stencil has attached to it a brass hinge, slotted to receive a thumb screw on the table. The prepared sign cloth is hung on the roller *E*, which is provided with a small crank and pawl. The cloth is then run over the table and clamped in a groove, after which tension is applied with the crank and retained by the pawl. This stretches the cloth smooth for the printing.

The stencil frame is swung down and locked firmly by means of two cam levers, *F*. Paint is applied to one edge of the stencil and one sweep of the squeegee completes the process of printing. The stencil is then swung up out of the way, and the printed section of the sign is cut and removed for drying. When not in use, the stencil frames are stored in the rack shown in another illustration.

Maintenance signs are made up in small sections because, in general, only comparatively small sections of the sign curtains wear out. Consequently, only these worn sections need to be cut out and replaced.

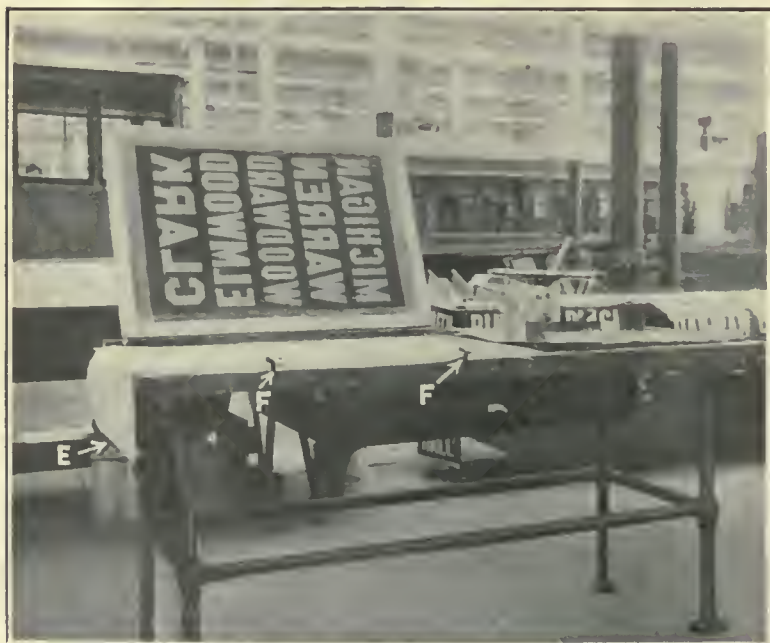
The black paint used for the printing is made according to the following formula: 5 lb. ivory black ground in linseed oil, 1 pt. raw linseed oil, $\frac{3}{4}$ pt. gold size Japan, and $\frac{1}{2}$ pt. turpentine.

The previous cost of painting signs averaged \$14.30 per sign including material. The new method has reduced this cost to \$5.22 per sign.

Service Stripes for Detroit Trainmen

THE use of service stripes to designate length of service was recently begun by the Department of Street Railways, city of Detroit. A silver bar will be given for each year of service up to 5, when a gold bar will supplant the four silver bars. In addition to a gold bar for each 5 years of service a silver bar is shown for each year between 5 and 10 and 10 and 15. After 15 years of service gold bars only are worn, unless future developments indicate that the men themselves prefer to have the detailed service record displayed. Previous service with the Detroit United Railways will be counted.

The management believes that public relations will be improved by this step. When a trainman insists upon the observance of regulations by passengers, some people think he is only a novice. This idea will be changed by displaying evidence of the employee's service. On the other hand, the awarding of service stripes will tend to improve the morale of the trainmen.



Signs Are Printed on the Handy Table Shown at the Left, and When Not in Use Stencils Are Stored in Convenient Racks Shown at the Right

The stencil of silk with paper letters applied with shellac is hinged to the side of the table so that it can be readily lowered into position over the cloth. The roller *E* has a crank and pawl by means of which the cloth is stretched tight for printing.

One-Man Cars Successful in Denver

Approximately 40 per Cent of Both City and Inter-urban Service Is Now Operated by One-Man Cars—Older Rolling Stock Was Rebuilt with Front Entrance and Center Exit

DURING the past year the Denver Tramway instituted one-man car service on several of its city lines and on the interurban division. This has been extended gradually with satisfactory results. Since Jan. 1, 1924, all owl service has been operated in that way as well as the day schedules on the Cherokee, Platte &



Front-Entrance and Center-Exit Arrangement on the Rebuilt Denver One-Man Cars. Note the Low Partition Which Incloses the Operator's Position

Globeville line. One-man operation has also been adopted on the Lyden & Golden division of the Denver & Intermountain Railroad, and on the Fifth Avenue line, serving an exclusive residential section of the city.

It has been general practice to increase the service up to 25 per cent in the number of cars when one-man operation is commenced. Approximately 40 per cent of the cars now in service are of the one-man type. Experience has shown that schedules are maintained as well as, or in some cases even better than, with two men. Operation by one man has not been found a handicap to carrying out the general policy of speeding up service on the entire property. Average schedule speeds are now approximately 10.4 m.p.h., including all layovers, dead time and stopping time. This also includes trailer operation during the rush hours.

On one-man city cars the practice is to have the passengers enter at the front and leave at the center of the car. This "circulating type" of construction has been found to give such rapid loading and unloading of the one-man cars as to have permitted a general increase in schedule speeds. On one-man interurban cars the exit and entrance are both at the front end. This is necessary for the collection of zone fares. The custom is to collect the city fare when the passenger boards the car and when he alights from the car to collect the proper interurban fare, which is based on the distance the passenger rides. Inbound to the city, the passenger pays the interurban fare on entering the car and is hat checked to intermediate points if he is not riding all the way into the city. The city fare is then paid upon leaving the car.

The success with which the general program of increasing schedule speed has been carried out in Denver is strikingly illustrated in the accompanying tabulation:

AVERAGE SCHEDULE SPEEDS ON ALL LINES IN DENVER		
Year		Schedule Speeds M. p. h.
1917	.....	9.66
1918	.....	9.63
1919	.....	9.40
1920	.....	9.03
1921	.....	*9.90
1922	.....	10.30
1923	.....	10.29
1924	.....	10.40-10.50

*New men after strike.

Some of the older, double-truck cars, which were formerly operated with two men, have been rebuilt for one-man operation. These cars are built of wood with concave-convex side panels. Motor and truck equipment was in fairly good condition, but the side panels, body floors and other parts of the structure in some cases required attention. Consequently, the wood panels were removed, necessary repairs were made to wood posts, new floors laid where needed and the entire body overhauled. The former wood panels were replaced with Haskelite. This material was used to add strength to the side structure.

Pneumatic door equipment and full safety car devices were installed on the cars, and body changes necessary for the construction of a single-exit door at the center were made. The finished appearance of the interior of these cars is shown in the accompanying illustration.

Two-Sided Car Window Cards Used in Chattanooga

IN THE merchandising of the trolley service and of the electric power service in Chattanooga, Tenn., the Tennessee Electric Power Company utilizes a part of the window openings in the manner illustrated. Cards are mounted in alternate windows and, being narrow (not



Car-Card Holder Used to Advertise Railway and Power Service in Chattanooga

more than 9 in. wide) they do not prevent the use of the windows for their primary purposes, permitting the passengers to enjoy the view outside and admitting light to the interior of the car. The card face presented to the interior of the car carries an individual advertisement, while the side facing the street carries one or two words of a legend which extends from end to end of the car.

The fixture for holding the card consists of a metal strip at top and bottom, spanning from casing to casing and bent over to form a groove. Its width is about 1 in. The two strips are joined near each end by flat vertical pieces of metal $1\frac{1}{4}$ in. wide. Steel springs $\frac{3}{8}$ in. wide slip into the grooves and hold the cards in place.

Side Cars Reduce Package Freight Costs

IN CONNECTION with its package freight service the Hydro-Electric Railways, which operates an inter-urban service out of Toronto, Canada, has recently installed a system of pick-up and delivery service by motorcycles with side cars. These are used principally for the long hauls on the outskirts of the cartage area served by the railway. According to W. R. Robertson, general superintendent, a motorcycle with side car will handle up to 1,000 lb. of packages and make 75 miles per day on $1\frac{1}{2}$ gal. gasoline and $\frac{1}{4}$ pint of oil. The average weight of packages handled by one of the cars is 5,000 lb. per day. The side cars have been found of particular advantage in getting around traffic blockades, and are able to make better speed than standard trucks. While considerable snow has already been encountered, no more difficulty has been experienced with the side cars than with ordinary motor trucks.

Previous to installing the new service which is given with three side-car motorcycles, the railway was operating as many as 10 gasoline trucks, each of which was making an average of 28 miles per day. It has been found possible to reduce this number, making a total of seven vehicles for the improved service.

Gasoline-Driven Car Float Effects Economy*

AMONG the physical difficulties encountered along the route of the San Francisco-Sacramento Railroad are 1 mile of $4\frac{1}{2}$ per cent grade, a single trestle 13,571 ft. in length, a tunnel 3,500 ft. long and the presence of Suisun Bay in the middle of the route. All trains, both freight and passenger, have to be taken across this body of water on car floats. For this purpose steam-operated floats were formerly used, but

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

the company has lately built a gasoline-driven ferry.

This boat was designed and built by the railway and its operation shows a considerable saving over the former steam floats. In the case of the latter it is necessary for steam pressure to be maintained continuously during 24 hours of the day in order to give day and night service. With the gasoline-driven car float the engine is shut off as soon as the boat has docked. The saving accomplished is considerable because the trip across the bay consumes only 10 minutes and the layover is approximately 1 hour.

For the convenience of passengers a dining room is operated on this boat and the deck has been built up to the level of the top of the rail so that passengers can walk around and enjoy the trip.

The Readers' Forum

Snow Renewal in the Smaller City

YORK RAILWAYS

YORK, PA., Jan. 27, 1925.

To the Editor:

I have read with much interest your editorial in the issue of Jan. 24 entitled "Must the Railway Remove Snow from the Whole Street?"

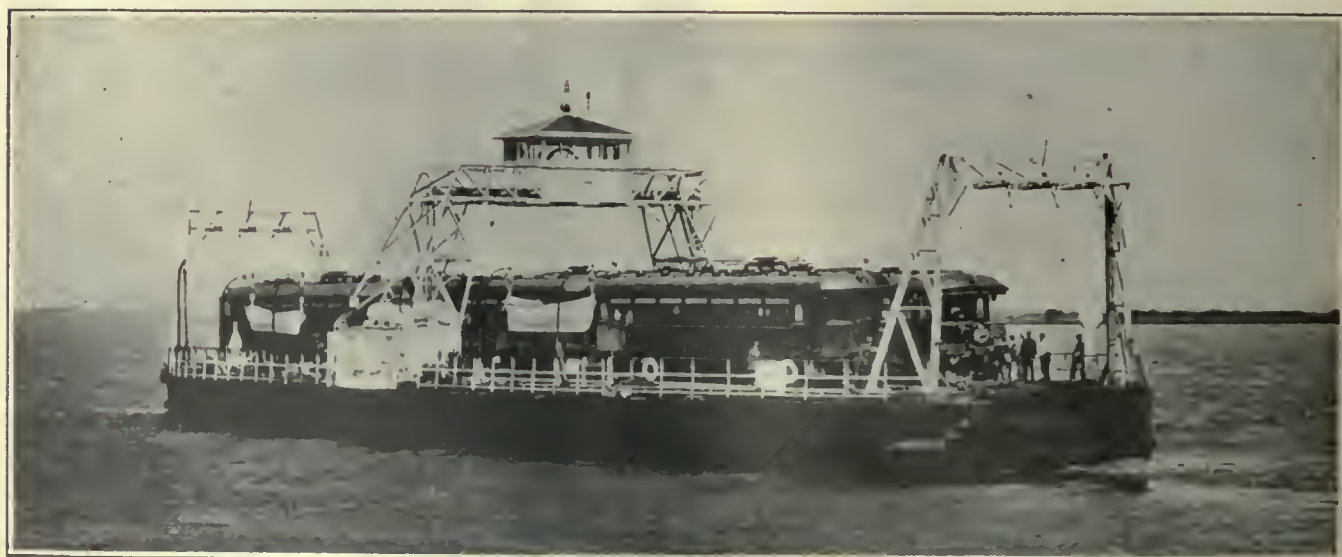
Snow conditions as outlined therein are prevalent in this community and have resulted in slowing up our service considerably. However, notwithstanding the effect on service since the first heavy fall of snow this month, we have shown a considerable increase in railway revenue, due to the fact that, at least, some of the private automobiles have been parked in the garage until streets and roads are again in normal condition.

I estimate for the month of January a $7\frac{1}{2}$ per cent increase in railway revenue as compared with the same month in 1924, due almost entirely to the recent snowstorms. Previous to the snow, we were showing decreases each day.

In this city, if we should clear the snow from the sides of the streets on which we operate, it would result in increased expense and decreased revenue, as we would be providing additional roadway for automobiles.

J. E. WAYNE,

Vice-President and General Manager.



All Trains of the San Francisco-Sacramento Railroad Cross Suisun Bay on this Gasoline-Driven Car Float

Association News & Discussions

New England Club Discusses Car Weights

Savings in Operating Cost Due to Weight Reduction, Use of Gas-Electric Buses and Pulverized Fuel Fill Program

THE Feb. 5 meeting of the New England Street Railway Club was devoted to rolling stock and power plant topics, the principal speakers being John Lindall, superintendent rolling stock and shops, Boston Elevated Railway, on "Weight Carrying Costs"; J. C. Thirlwall, railway department, General Electric Company, on "Gasoline-Electric Buses," and W. C. Slade, vice-president United Electric Railways, Providence, R. I., on "The Pulverized Coal Installation of the Manchester Street Station in Providence." President T. H. Kendrigan occupied the chair, and the usual afternoon meeting, dinner and evening session were held at the Copley-Plaza Hotel. J. A. Queeney, president Philadelphia Rural Transit Company, gave an informal address on the gas-electric motor bus problem at Philadelphia, and Charles C. Peirce of the General Electric Company, Boston, outlined the changing conditions in equipment which traction men have met during the past decade and made a plea for open-minded consideration of future methods of public transportation in urban and suburban territory.

Mr. Lindall reviewed a comprehensive study of the cost of dead-weight haulage made by him a few months ago and summarized in *ELECTRIC RAILWAY JOURNAL*, issue of July 26, 1924. Following the presentation of these figures, E. P. Locke, engineer of car design Boston Elevated Railway, described the analysis of the East Boston Tunnel car design which preceded the building of these rolling stock units, in which a total saving of about 10,000 lb. per car was achieved. These cars were described in this paper for Aug. 23, 1924. In passing it may be recalled that weight reduction was secured among other ways by the use of outside doors and a wall of one thickness, by special floor construction, by using a semi-arch type of roof and equipping the cars for one-end operation each and in trains. It is estimated that the additional cost of hauling cars in tunnel service would have been \$108,000 per year had they been designed along the general lines of the previous Boston Elevated rapid transit cars.

Mr. Thirlwall said that figures made by his company agreed with Mr. Lindall's on the cost of weight haulage. For city service a fair average of 150 watt-hours per ton-mile is acceptable at the direct-current bus. A car running 36,000 miles per year thus consumes 5,400 kw.-hr. per ton (d.c.) per year. Maintenance may be 0.2 cent per ton-mile. Computing the power

cost at \$81 per ton per year and the maintenance at \$72 per ton per year the total is roughly \$150. Modern street cars have a first cost of about \$800 per ton. One ton of car weight calls for the equivalent of 2-kw. capacity in generating plant and substation.

R. D. Hood, Haverhill, Mass., estimated that when maintenance costs reach 10 cents per car-mile, it is time seriously to consider retiring the rolling stock.

OPERATING RESULTS WITH LIGHT CARS

A. J. Boardman, manager Brockton division Eastern Massachusetts Street Railway, said that in his opinion the one factor that stands between the street railways and prosperity is excess and unnecessary weight of cars. In

The decrease in energy consumption with the light-weight equipment is not always accomplished unless the light-weight cars are put into the service for which they are designed and geared. It was found on one line of the Eastern Massachusetts that when a light-weight, double-truck car of 16 tons was substituted for a standard 21-ton double-truck car, both operating on the standard schedule with the same number of stops per mile and the same gear ratio, there was a saving of only 5 per cent in energy. Using a properly geared light-weight car on the same route, the saving in energy consumption over the heavy double-truck car was approximately 19 per cent on a few trips, and would probably be greater still over a fair period of time.

A study of another line showed that the substitution of a light-weight double-truck car for a standard double-truck car with the same gear ratio would save on this route with a schedule of 197,467 car-miles \$1,760 per

INCREASE IN SINGLE-TRUCK MILEAGE								Per Cent Light- Weight Cars
	Single Truck	Per Cent	Double Truck	Per Cent	Light- Weight Double Truck	Per Cent	Total	
1920....	265,635	10	2,288,603	90	.....	0	2,554,238	10
1921....	598,277	26	1,692,778	74	.....	0	2,300,945	26
1922....	549,033	24.7	1,490,231*	65	259,250*	11.3	2,298,414	36
1923....	437,666	19.8	998,190*	45	775,625*	35	2,211,481	64
1924....	508,366	24.2	785,576*	38	775,625*	38	2,069,567	62

* Estimated.

1917 the standard semi-steel double-truck car on his property weighed 900 lb. per seat. The so-called light-weight car weighs 685 lb. per seat and the Birney car 530 lb. per seat. The Twin City experimental light-weight double-truck car weighs 375 lb. per seat.

The bearing of equipment weights on power consumption is shown by the following figures:

The direct-current kilowatt-hours per car-mile of the Brockton division of the Eastern Massachusetts for the past 5 years was: In 1920, 4.76; 1921, 3.699; 1922, 3.879; 1923, 3.80; 1924, 3.52—a reduction in 5 years of 1.24 kw.-hr per car-mile, or of 26 per cent. Had the company operated in 1924 at 4.76 kw.-hr. per car-mile, the power charge in the Brockton district would have been increased last year by \$45,422 at a rate of 1.77 cents per kw.-hr. According to Mr. Boardman this decrease is due to (1) modern light-weight equipment; and (2) better track return by welding and bonding. The reduction in passenger car weight has been due (a) to the use of the Birney type safety car, and (b) to the use of double-truck cars weighing about 32,000 lb. against 42,000 lb. for the standard double-truck car. The increase of the mileage of the Birney cars and the light-weight, double-truck cars has been from zero in 1920 to about 62 per cent in 1924.

year in energy alone. The schedule speed is 15 m.p.h.

Again the company was operating double-truck, light-weight cars on a city and suburban line with a schedule speed of 9.5 m.p.h. Business fell off on account of industrial conditions, and these cars were replaced with standard Birneys. The light-weight, double-truck cars were put on another line with a schedule speed of 12.5 m.p.h. and they maintained this without difficulty. Temperature readings of the motors were satisfactory and it was also found that these cars could be operated on the route nine months in the year with a material saving in energy; for the other three months a heavier type of car was needed on account of the need for better traction to surmount grades and to fight snow.

Frequent use of single-truck Birney cars is made wherever traffic and service conditions warrant, care being taken to avoid overcrowding. If there is overcrowding the saving in power is offset by popular prejudice against this type of car. By service checks it is possible accurately to determine when to use these cars. It has been found that the seasonable variation in their mileage from summer to winter on the Eastern Massachusetts is as high as 260 per cent, the maximum use of these cars being in summer.

F. B. Walker, chief engineer maintenance of way Eastern Massachusetts Street Railway, Boston, pointed out that Massachusetts is assessing the electric railways a high proportion of bridge rebuilding costs, figuring these on a theoretical 100,000 lb. car used for computation purpose by the Department of Public Utilities. This allocation should be successfully disputed with the advent of light-weight cars.

GAS-ELECTRIC BUSES DISCUSSED

In discussing the gas-electric bus problem, Mr. Queeney said that the approach was through the inquiry as to what could be done in order to carry the maximum number of passengers, regardless of the type of motive power involved. Last year New York taxicabs earned \$25,000,000 more than all the street cars of the metropolis. He outlined the study which led to the selection of gas-electric as against straight gasoline motor drive. It is expected that there will be economies in running gear maintenance and that faster and more comfortable schedules will be secured by the gas-electric bus. There have been 125 double-deck buses of this type purchased for the Philadelphia company (capacity 66 passengers) and 75 single-deckers holding 33 passengers each. The street railway man who goes into the bus field must be prepared for a surprise in the increased cost of maintenance compared with electric car service.

An abstract of Mr. Slade's paper will appear in a later issue.

Association Secretaries Meet

THE annual meeting of the Association of Public Utility Secretaries was held on Feb. 9 at St. Louis. Discussion of ways and means of increasing the effectiveness of utility association work constituted the business transacted. The following subjects were discussed:

"Committee Organization and Work," D. L. Gaskill, Ohio; "Section Meetings Within State Associations," J. N. Cadby, Wisconsin; "Entertainment at Conventions," R. V. Prather, Illinois, and F. D. Beardslee, Missouri; "Program Materials and Arrangements," K. R. Noyes, American Gas Association; "The Extent to Which Organization Should Be Carried," H. M. Davis, Wisconsin, and H. L. Jones, Kansas, and "Bulletins and Publication," J. W. Colton, editor *Aera*.

Following the exchange of ideas, Secretary E. N. Willis of the Southwestern Association was re-elected president and J. N. Cadby of the Wisconsin Association, secretary.

Bluff Point Selected for New York State Meeting

BLUFF POINT, N. Y., on Lake Champlain, has been selected by the executive committee of the New York Electric Railway Association as the place of its annual meeting.

In view of the importance of the subjects confronting the industry today and the interest shown at previous meetings it was decided to hold a 2-day meeting on June 26 and 27.

Further details regarding the program will be published later.

Overhead Line Material Standardization

A CONFERENCE on the unification of overhead line materials was held at New York on Jan. 13, representatives of nineteen interested organizations being present.

The conference recommended by unanimous action that an extensive program on the unification of overhead line materials go forward, under the procedure of the American Engineering Standards Committee. It was decided that the work should include cross-arms, pins, pole steps, brackets and molding; pole line hardware, including such items as anchor rods, bolts and lag screws, brackets, cross-arm braces, guy fittings, pins and strand for suspension and guying, and strain insulators, spools, knobs, etc.

There was an extended discussion as to whether work on insulations should be limited to low-voltage material or whether the other important types of insulators should be included. A small committee appointed to formulate definite recommendations reported the following recommendations, which were unanimously approved:

Certain classes of insulators have reached a stage of development which seems to warrant standardization; others can be standardized as to certain important dimensions; still others are in a development stage which makes attempted standardization, other than along the broadest of lines, of questionable wisdom.

It is recommended that standardization in this general field be undertaken to such an extent as the facts developed by a sub-committee, or such other agency assigned to this work, may seem to warrant.

Of the other types, strain insulators for low potentials, spools, knobs, etc., which are used in common by the several branches, standardization is recommended.

The conference agreed that the work should include nomenclature, material specifications and dimensional data.

The following committee, advisory to the A.E.S.C. in the organization of the work, was appointed: R. F. Horsford, American Telephone & Telegraph Company, chairman; Alexander Maxwell, National Electric Light Association; G. C. Hecker, American Electric Railway Association; C. C. Beck, Associated Manufacturers of Electrical Supplies; J. C. Johnson, Telephone Section, and George Eisenhauer, Electrical Section, American Railway Association.

An important part of this committee's work will be a recommendation on the question of sponsorship. All interested groups will participate in the work through representation on one or more sectional committees which will be set up for the work.

C. E. Skinner, chairman of the A.E.S.C., acted as chairman of the conference.

Oklahoma Convention Will Be Held March 10-12

A NUMBER of well-known public utility executives will address the seventh annual convention of the Oklahoma Utilities Association, to be held at Oklahoma City, March 10, 11 and 12. "Community Transportation" will be the subject of a paper by F. R. Coates, of Henry L. Doherty & Company, New York. M. H. Aylesworth, managing director National Electric Light Association, New York; Miss R. E. McKee, national chairman Women's Public In-

formation Committee of the N.E.L.A.; W. S. Vivian, director of public relations Middle West Utilities Company, Chicago, and John C. Hall, St. Louis, are among the other speakers.

Illinois Association Meets March 18-19

THE Illinois Electric Railway Association will hold a joint convention with the Illinois Electric Association and the Illinois Gas Association at the Sherman Hotel, Chicago, March 18 and 19.

As announced by Secretary R. V. Prather, there will be a joint session during the morning of each day, and separate meetings of the gas, electric and electric railway associations in the afternoons. The annual banquet will be held on Wednesday night.

Two new features of this convention will be a group luncheon on Wednesday, at which time tables will be arranged for executives, accountants, engineers, etc., and a utility advertising exhibit.

The program of the electric railway sessions follow:

March 19, 1:30 P.M.

"Merchandising Electric Railroad Transportation," by D. W. Snyder, Jr., vice-president Illinois Traction System, Springfield; J. F. Egolf, general manager Aurora, Elgin & Fox River Electric Company, Aurora; John J. Moran, commercial manager Chicago Rapid Transit Company, Chicago.

"Bus Transportation."

1. "As Replacing Railway Operation," by C. G. Moore, general manager and purchasing agent Plainfield & Joliet Railroad, Joliet.

2. "As a Feeder to Electric Railway Operation," by B. W. Arnold, manager motor coach department Chicago, North Shore & Milwaukee Railroad, Milwaukee.

3. "Joint Service," by M. L. Harry, division manager Illinois Power & Light Corporation, Decatur.

March 18, 1:30 P.M.

"Maintenance."

1. "Equipment."

2. "Overhead Construction," by F. V. Skelley, superintendent Tri-City Railway, Rock Island.

3. "Track," by J. I. Catherman, engineer maintenance of way Illinois Traction System, Springfield.

"Safety and Insurance," by C. B. Scott, Bureau of Safety, Chicago.

"General Discussion of Railway Problems," by J. R. Blackhall, J. H. McClure, R. F. Palmblade, George A. Mills, W. H. Sawyer, F. E. Fisher, W. C. Sparks and W. L. Arnold.

Locomotive Motor Design Discussed by A.I.E.E.

FACTORS affecting the design of direct-current motors for locomotives were discussed by Ralph E. Ferris, Westinghouse Electric & Manufacturing Company, in a paper presented at the midwinter convention of the American Institute of Electrical Engineers at New York on Feb. 9-12. A comparison was made between different types of motor mounting, as regards the amount of power which may be developed in the available space with direct-current motors. The comparisons are largely qualitative, the author states, but within reasonable limits they may also be considered quantitative. Designs for 1,000 volts and 3,000 volts only were considered, although the same principles are stated to be applicable to other voltages.

The various factors are taken up in a mathematical discussion, which covers

the effect of various limitations which were imposed by the conditions of track, method of motor mounting and output.

The output factor increases, in general, with increase of armature diameter, the relation being quite complicated. There is a real limit to the amount of power which may be placed between the wheels with an axle mounting, regardless of wheel size. Fortunately, this limit is sufficiently high to permit of a fairly heavy axle loading with speeds of between 15 m.p.h. and 20 m.p.h. This, coupled with the simplicity of drive and ruggedness of motor construction, place the combination well toward the front as a solution of the d.c. heavy traction problem. With quill drive it is found desirable to have somewhat more clearance between the wheel flange and the end housing of the motor than in axle mounting. Otherwise the proportions of space are the same and, therefore, the curves of output will be approximately the same as those for axle mounting. The quill drive does, however, permit the use of a twin motor construction and thus, unless limited by the drive, gives twice the power

per axle as with an axle-hung motor. In the case of frame-mounted motors, with side rod or gear and side rod drive, if the motor is made self-contained, so that it may be lifted out of the locomotive frame complete, there will be less room available for active material than if the armature bearings are mounted in the side frame of the locomotive and end housings are omitted.

In his conclusions, the author states that axle-mounted, direct-current motors may be built which have sufficient power to permit fairly heavy axle loadings. Quill drive d.c. motors may be built, of which the power per axle will probably be limited by the method of transmitting power to the wheels rather than by the motors themselves. On the contrary, d.c. motors for side-rod or gear and side-rod drive may be built to develop practically any desired power. Gearless motors may be built which have sufficient power for comparatively light axle loadings, this light loading necessitating a larger number of axles for a given locomotive rating than would otherwise be used. A lower-voltage motor has a definite advantage in possibilities of greater output for a given armature diameter.

whether the company receives the award or not.

The presentations made in the year 1923 were printed in bound book form, which has had the widest possible distribution throughout the country and has been received everywhere as tangible evidence of the progress of the industry. The 1924 presentations are now in the course of preparation for printing in similar book form, as the committee desires to perpetuate this record of the industry's accomplishments.

The announcement of the award will be made at the annual convention of the association in October, 1925. Presentations should be addressed to the Charles A. Coffin Committee of the American Electric Railway Association, 292 Madison Avenue, New York City, N. Y.

Engineering Symbols

A MEETING of the special committee on engineering symbols was held at association headquarters, New York, on Feb. 2. Members present were H. R. Stamm, chairman; R. C. Cram, H. W. Coddington and C. W. Squier. The work of previous committees in preparing engineering symbols was gone over and it was decided that the work of the 1925 committee should include the preparation of all engineering symbols which are applicable to the electric railway industry.

The various types of symbols were divided into six groups as follows: (1) Topographical, (2) buildings and structures, (3) electrical, (4) railroad, (5) mathematical, (6) mechanical equipment.

Assignments were made to various members of the committee to work up symbols in each group.

Metropolitan Section Grows

AT THE meeting of the Metropolitan Section of the American Electric Railway Association held at the Engineering Societies Building, New York City, on Feb. 6, announcement was made by President W. E. Thompson that the membership had reached a total of 796, an increase of 25 since the last meeting. Before adjournment the total had swelled further to more than 800.

The technical papers presented at the meeting included one on power generation in the metropolitan district by J. H. Williams, assistant engineer motive power department, Interborough Rapid Transit Company, and one on power conversion and distribution by W. O. Wentworth, engineer transmission department, New York Central Lines.

According to Mr. Williams the electrical output in the metropolitan district is now 6,200,000 kw.-hr. annually, being 11 per cent of the total output of the entire United States.

Discussing the paper H. D. Sheflin of the Westinghouse Electric & Manufacturing Company stated that the coal rate for energy generated in the metropolitan district can be reduced by installation of larger units utilizing higher steam pressures and temperatures, and by the elimination of small isolated plants.

American Association News

Coffin Prize Conditions Changed

THE Charles A. Coffin Prize Committee of the American Electric Railway Association, consisting of President J. N. Shannahan, James H. McGraw and F. R. Coates, has recently sent out a circular letter describing the terms of the 1925 contest.

Under the terms of the Charles A. Coffin Foundation this award is given annually to the electric railway company within the United States which during the year has made distinguished contribution to the development of electric railway transportation for the convenience of the public and the benefit of the industry. The award consists of a gold medal for the winning company and \$1,000 which is given to the company's employees' benefit association or similar organization.

Inasmuch as there has been some change in the form of the measuring stick which the committee will use in determining the winner, the factors used are given below in full:

1. The success in gaining public good will as indicated by the initiative, skill and enterprise manifested in popularizing electric railway service—more riders and more revenue.

2. The economies which had been introduced in operation resulting from original ideas, as well as the extent to which the company has taken advantage of new developments in operating and maintenance practice and equipment originating with others.

3. Improvements in construction practice which have resulted in reduced first cost, reduced maintenance, or greater reliability of service.

4. Particular success in conducting a safety program and actually reducing

the number and seriousness of accidents.

5. Outstanding accomplishment in development of good relations between management and employees.

6. Special accomplishment in financing, which reduces the cost of new capital, such as the distribution of securities among customers and employees, rearrangement of the financial structure, etc.

All participants are requested to present financial and operating statements on a unit basis covering the period of the last 12 months available in comparison with the previous 12 months, or for a period of years (revenues, expenses, taxes, fixed charges traffic and mileage figures, shown in accordance with A.E.R.A. detail classification, all of which, if desired, will be considered confidential).

The preference of the committee is that all presentations be made on standard typewritten sheets and accompanied by such supporting figures and drawings as may be required. All presentations must be in the hands of the committee by Aug. 1, 1925, and companies are requested to limit their accomplishments as far as possible to those occurring in the year ending as nearly as possible with this date. However, any accomplishment extending over a period of years and reaching its fruition in this period will be considered by the committee as relevant. The committee requests that each presentation be made in such form that it may be retained as the property of the association and that consent be given to its publication either in whole or in part with the name of the company, except such as may be marked confidential,

Maintenance of Equipment

Portland Signal Failures Decrease

By H. J. CHARTERS
Portland Electric Power Company,
Portland, Ore.

THE number of operations per failure of the block signals on the interurban lines of the Portland Electric Power Company at Portland, Ore., has increased nearly 100 per cent, as shown by the annual signal report for 1924. During the past year 17,088 movements of the signals occurred for every failure recorded as compared with 9,103 for 1923. [See ELECTRIC RAILWAY JOURNAL for April 12, 1924, page 588.—Ed.]

But one failure of the actual signal mechanism of the Type G-1 United States signals in use on this

SIGNAL FAILURES BY MONTHS AND YEARS				
	1921	1922	1923	1924
January.....	..	6	22	2
February.....	..	5	10	3
March.....	10	3	13	5
April.....	13	8	8	5
May.....	17	4	8	4
June.....	9	15	16	10
July.....	16	8	6	8
August.....	12	1	8	5
September.....	8	1	4	3
October.....	6	8	2	7
November.....	16	6	6	1
December.....	10	9	5	5
Total.....	117	74	108	58

road took place. This failure was caused by moisture corroding the winding on a semaphore coil, which could not be seen by the maintainer and which eventually caused an open circuit. While no indication could be received under this condition, complete protection was afforded as the relay governing the signals was set to protect the train entering the block; hence an opposing train could not receive a clear indication from

Decrease in the proportion of contactor failures is to be noted in the report, although during December the coldest weather in 50 years was experienced in this locality. Failures from blown fuses also decreased during the year, principally due to the absence of electrical storms. The manufacturers recently increased the size of the fuses in this type of signal from 2 amp. to 5 amp., but no changes have been made by this company as the smaller fuse gives satisfactory results.

Directional relay and contactor

BLOCK SIGNAL FAILURES, INTERURBAN LINES OF THE PORTLAND ELECTRIC POWER COMPANY, 1921-24

Number of miles of track blocked:	1921	1922	1923	1924
All divisions.....	21	21	21	21
Number of blocks.....	20	20	20	20
Number of signals.....	40	40	41	41
Total movement of signals.....	843,464	991,082	991,082	991,082
Average movement per block.....	42,173	49,554	49,554	49,554
Average daily movement per block.....	138	136	136	136
Number of movements per failure..	7,148	13,393	9,103	17,088

ANALYSIS OF FAILURES

	1921		1922		1923		1924	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Line wires.....	5	4	5	7	6	5.56	0	.....
Switch and pole wiring.....	2	2	3	4	12	11.11	3	5.17
Blown fuses.....	7	6	3	4	15	13.89	5	8.62
Directional relay.....	29	25	22	30	34	31.48	16	27.59
Signal trouble.....	6	5	1	1	3	2.78	1	1.72
Contactors.....	44	38	26	35	24	22.22	13	22.42
No. 5 switch.....	7	6	2	3	8	7.40	10	17.24
Miscellaneous.....	6	5	1	1	0	.....	4	6.89
No trouble found.....	11	9	11	15	6	5.56	6	10.34
Total.....	117	100.00	74	100.00	108	100.00	58	100.00

troubles continue to be the main source of interruptions, although during the year different types of contactors were tried without much success.

No. 5 contactor switch failures increased considerably during the period due to a shortening of the scheduled running time between terminals. Under such conditions the signals are of more value than before, but it is difficult to control the speed of trains while passing under these contactors.

No changes were made during the year in the number of scheduled trains. Therefore the figures for average movements remain the same as in the two preceding years.

No additional signals were in-

stalled on the interurban lines in the period, but several betterments were made in the form of repeating indicators so that it might not be necessary for the motorman to look back to see the signal clear as he leaves the block when approaching stations or obscured crossings.

Line Truck Used for Many Jobs

AN UNUSUALLY well-equipped truck is used by the United Railways of St. Louis for the maintenance of overhead and underground distribution systems. It is equipped with an overhead collapsible tower and a full complement of ladders, tackle and hand tools. In addition



This Line Truck Is Equipped so that It Is Handy for Many Different Jobs on the Property

to the storage space in the bed of the truck body, two long tool boxes extend along either side to give additional capacity for materials and tools, and a locker below the bed makes use of the space between the rear wheels, and the rear step.

For underground work, a spotlight is mounted at the back end in such a position that it is convenient for lighting up manholes. An extension on the hub of one of the rear wheels forms a convenient point for wrapping a rope, so that by jacking up the rear wheel it becomes a very effective windlass for pulling in underground cables or other similar work requiring considerable power.

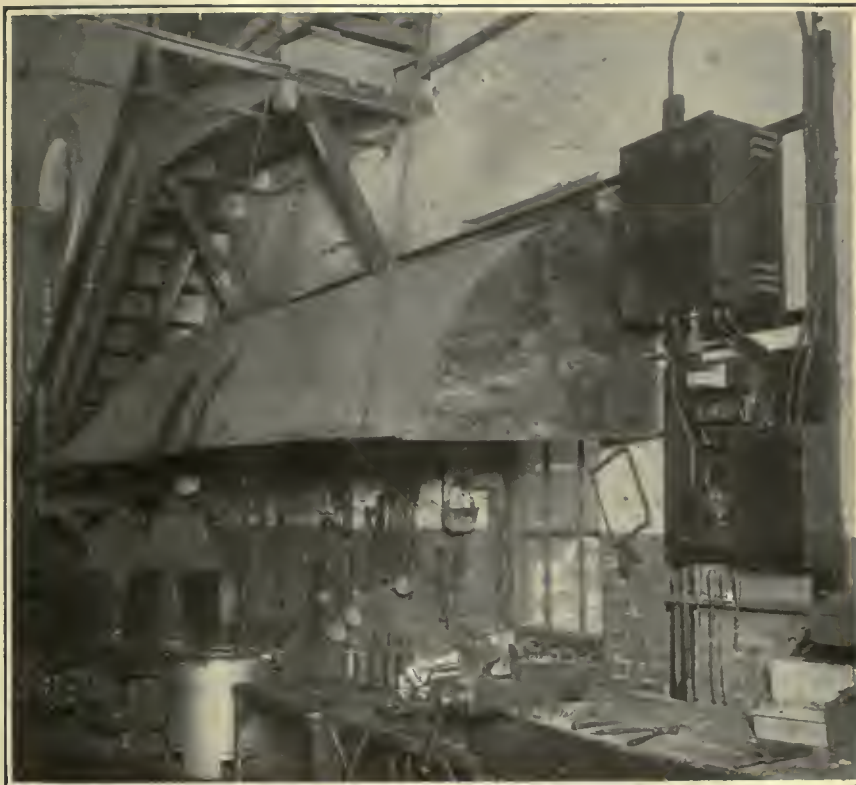
A removable snow plow is handy for clearing up snow around the yards.

Preventing Freezing of Air Pipes

CONSIDERABLE trouble was experienced during the cold winter season by freezing of the air lines on safety cars of the Northern States Power Company, Fargo, N. D. A patented device filled with wood alcohol was tried with considerable success. The suggestion was made to pour wood alcohol into the pipes on cars not provided with the device. This latter method has given good satisfaction and has eliminated all freezing. About every 5 days 4 oz. of wood alcohol are poured into the pipe leading from the double check valve to the outside air reservoir. The amount of alcohol used will vary somewhat with weather conditions. The air reservoir is drained whenever new alcohol is added, but no draining is permitted between these intervals. It is found that the cost of alcohol used in this manner is more than justified by the improvement in service resulting from reduced number of delays due to frozen air.

Close Temperature Control Insures Good Babbitt Metal

AN ELECTRICALLY heated babbitt melting pot with thermostatic control has been found by the Washington Railway & Electric Company to be a great improvement over older types because it is possible with this apparatus to maintain the molten babbitt at a certain definite temperature. High grade babbitt metal can be made almost worthless for use in bearings by allowing it to become too hot. Similarly, pouring



This Babbitting Outfit in the Shops of the Washington Railway & Electric Company Has a Temperature Range of Only 4 Deg.

at too low a temperature is not conducive to good results. In the opinion of R. D. Voshall, superintendent of equipment and buildings, 915 deg. F. and 850 deg. F. are limits between which it is desirable to do babbitting.

To accomplish this the company has installed in its P Street shops a Westinghouse electric babbitt pot

with a Brown pyrometer to regulate the temperature. This is set at 900 deg. F. and is arranged to cut in at 2 deg. below that or cut out at 2 deg. above. The railway has found that the use of this apparatus is enabling it to effect economies in bearing maintenance that more than offset the cost of the outfit.

New Equipment Available

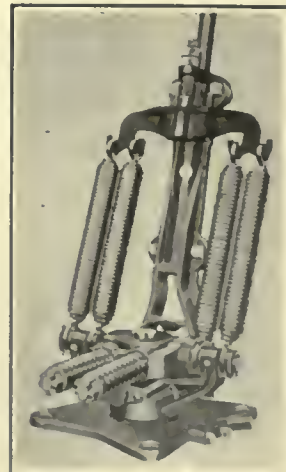
Trolley Base with Roller Bearings

A DESIGN of trolley base with several interesting features is being placed on the market by the Ohio Brass Company, Mansfield, Ohio. Standard Timken roller bearings have been embodied in the main bearings between the turret and the center of the stem casting. Two sizes of roller bearings support the base. The top one can be lifted off with the housing.

The base is fully bushed throughout at wearing parts and the tension springs, of which four are used, are held on bearing sleeves and forked casting bearings, which are also bushed.

The pole is held in place by two

bolted clamps, with a long support to provide a firm grip. The pole is held in its down position by a latch

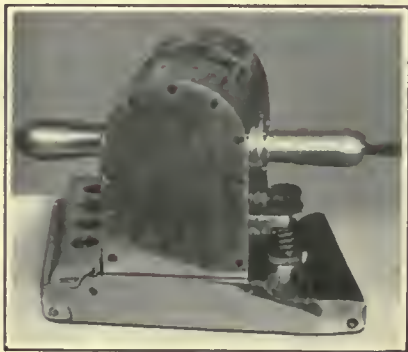


New Type Trolley Base

which engages with forked castings. The pedestal housing has a solid phosphor bronze brush, held against the pedestal post by a spring. This brush is electrically connected to the outside of the housing by a laminated copper jumper. The current is thus carried through this contact instead of through the roller bearings. A leather cup washer below the bottom bearing acts as a grease seal. The base is applicable to both city and interurban service. It weighs but 110 lb. and provides a uniform tension, regardless of the height of the trolley pole.

Portable Electric Sander

A NEW type of portable electric sanding and grinding machine which is said to do hand work at machine speed is being placed on the



New Type of Portable Sander

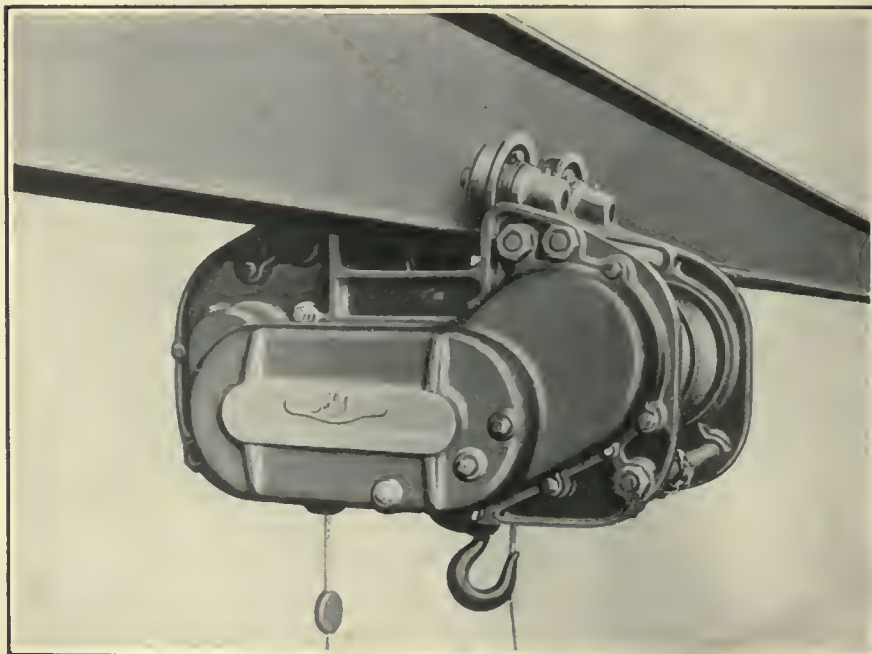
market by R. L. Barker & Company, Chicago, Ill. The outstanding mechanical features include gears and ball bearings which are totally inclosed in dustproof compartments

and run in oil. A universal motor of about $\frac{1}{2}$ -hp. rating is used for driving. This also is mounted in a dust-proof compartment. Motors for operating on either 110 or 220-volt circuits can be furnished.

The drum around which the sand or emery paper is clamped is dynamically balanced with all parts inclosed in the upper housing. The base is provided with rollers to guide the machine over the work, and the depth of cut can be accurately adjusted by means of a screw attachment underneath one of the handles. When the work of sanding or grinding is finished, a spring raises the machine from the work, so as to leave no mark. Metal abrasive paper can be used and applied in place of sandpaper, so that the machine is suitable for any kind of flat grinding as well as sanding. The cover is arranged so that all dust is held in and does not fly about the shop. The machine complete is 9 in. x 10 in. x 15 in. and weighs 23 lb.

Low Headroom Hoists

A LINE of electric hoists designed particularly to operate in locations with minimum headroom has been placed on the market recently by the American Engineering Company, Philadelphia, Pa. These hoists operate on a monorail with a minimum free space underneath the beam of from 10 to 15 in., depending on the size used. The motor and drum are arranged on opposite sides and parallel to the I-beam rail and the load block can be drawn up between them



Gear Side of Hoist Showing the Low Headroom Features

into the body of the hoist to within 1 in. of the bottom of the rail.

Accessibility of all working parts has been given particular consideration. Outer covers are provided which can be removed easily for inspection of parts and the motor can be taken out without removing the main frame or body of the machine. All gears are of drop-forged steel, and positive automatic lubrication is provided for all bearing parts. Hyatt high-duty bearings are used on the gear shaft and in the trolley wheels. An automatic lowering brake, a holding brake and an upper limit switch are provided to insure safe operation, and the brakes take effect instantly so as to stop the load without drift.

The hoist, which is being marketed under the trade name of "Lo-Hed," is built in capacities of from 1,000 to 12,000 lb. There are five types, four of which are arranged for operation from the ground. The fifth type is cab-controlled and has a motor-driven trolley.

Improved Snow Scrapers

TWO new types of snow scrapers for electric railway cars have been designed by the Root Spring Scraper Company, Kalamazoo, Mich. The No. 8 scraper is an improvement over the No. 7 and is designed particularly for safety cars and other types with low bodies. The improvements include reinforced spring



Improved Scraper, Type No. 8, with Reinforced Springs and Improved Blades

wrappers to give added strength for removing wet or hard packed snow.

A new design, type No. 9, has been brought out particularly for cars with higher bodies than the safety car type. The springs are 4 in. shorter than those of the No. 8 scraper. The material in the spring is high carbon steel with tungsten and other ingredients which, when oil tempered and drawn, make them tough and prevent crystallization.

The springs of the scrapers are shaped so that they yield when going forward or backward, but will not turn under the car.

The News of the Industry

Pay Increases Refused

Employees of San Francisco Municipal Property Told Company Is Without Funds—Ordinance to Seek Adjustment

Three groups of employees of the San Francisco Municipal Railway, San Francisco, Cal., have been refused raises in pay by the Board of Public Works and the matter is now in the hands of the Supervisors, to which body all power to change salaries has been delegated by a recently adopted amendment to the city charter.

Charles E. Stanton, a member of the Board of Public Works, told the representatives of the men at a conference held over the pay question:

"There is no money in the Municipal Railway's operating fund to meet the raises you demand."

To this F. P. Holling, president of the carmen's union, replied:

"You have lots of money. It's your bookkeeping system."

William Nanry of the Board of Municipal Research, supporting Colonel Stanton, declared that the proposed increase would add \$296,000 a year to the payroll.

"If these increases are granted," he added, "the road will face an annual deficit of from \$140,000 to \$150,000."

Supervisor Rossi, the author of the charter amendment standardizing city salaries, then asserted that he will prepare an ordinance for introduction to the Board of Supervisors to classify municipal railway employees, thus paving the way for a salary adjustment.

The increases asked are as follows:

Platform men from \$5.40 to \$6.40 a day, car repair men from \$6.40 to \$7.40 a day and trackmen from \$5.40 to \$6.40 a day.

POLITICAL CAREERS IN BALANCE

The San Francisco Supervisors find themselves placed in an embarrassing position. On the one hand, the Supervisors are advised by financial experts that it will create a deficit and throw the finances of the road into chaos if the demands are met. On the other hand, the Supervisors are faced with the problem of a coming election in which most of them will be candidates to succeed themselves. If they take a stand against the men it is possible that the labor element will back other candidates that will pledge more pay to the men. Labor, it must be remembered, holds the balance of power in San Francisco politics.

Another element to be considered is the taxpayer. His representatives have raised the cry that the road is losing money, that it will probably be in worse shape soon, with resultant higher taxes, and that the only solution of the difficulty is an increase in revenues. They are advocating a 6-cent fare.

Meanwhile, there are extensions that must be made if the road is to live up to its promises and keep up with the times. There is seemingly a lack of funds to make these extensions.

While the Supervisors are trying to find ways and means to meet the demands of the men George Lull, the city attorney, has been asked to rule on the question of the right of the Supervisors to take the matters of salaries out of the hands of the Board of Public Works and to decide whether or not the new charter amendment has been correctly interpreted.

Bus Regulation in Massachusetts Discussed

Street railways and bus companies are before the Massachusetts Legislature over the question of regulation. A hearing was held during the week ended Feb. 7 on the bill offered by Clinton Q. Richmond, general manager

of the Berkshire Street Railway, to require bus lines to secure a certificate of convenience and necessity from the Department of Public Utilities, in addition to holding a license from the local city or town authorities. Day Baker, chairman of the legislative committee of the motor coach committee, offered a bill at the hearing which, in substance, concedes that the buses should be regulated, but places the power of regulation with the Department of Public Works instead of with the Department of Public Utilities. Wide differences of opinion are expected to develop over the selection of the regulating body. James M. Swift, counsel for the Motor Coach Association of New England, seems to reflect the feeling that if the right of regulation were reposed with the Public Utilities Department that body might be constrained so to regulate the buses as to make it impossible to expand in a way they deem is their right.

\$603,000,000 Traction Ordinance in Chicago

Purchase Figures for Both the Surface Lines and the Elevated Go Before Council—Mr. Insull Discusses with Mayor Sale of "L" on Basis of \$90,000,000

A MUNICIPAL ownership traction ordinance totaling \$603,000,000 was submitted to the City Council of Chicago on Feb. 13, with conditions final except for the elevated lines terms. In a last-minute call on Mayor Dever, Samuel Insull consented to reopen negotiations for the sale of the elevated lines with his first definite price offer. The sum he fixed was \$90,000,000. The ordinance as adopted by the traction committee carried a tentative price of \$79,000,000 for the elevated. The ordinance is subject to referendum in April. It provides for the following expenditure by the city to be met entirely with notes: Surface Lines, \$163,091,038; elevated inside city, \$79,000,000; elevated outside city, \$1,200,000; subway and extensions to surface lines and elevated, \$360,000,000. There is an optional plan for additional subway and elevated construction by the city if Mr. Insull and the city cannot agree on the sale of the elevated lines operated by the Chicago Rapid Transit Company.

The fine hand of former Mayor William Hale Thompson, actuating the Federation of Labor mouthpiece in the Chicago City Council, had a few days before thrown into confusion a traction committee meeting, at which Mayor Dever presented the price figure for the purchase of the Chicago Surface Lines. The cardinal purpose—the setting of a price limit for negotiating with the elevated lines—was frustrated, however, and the committee subsequently

adopted a figure submitted by Major R. J. Kelker, Jr., its engineer.

The Mayor had hardly completed the presentation of the surface lines terms of \$162,000,000 than Alderman Oscar Nelson, a political stepchild of Thompson, adopted to keep the traction question in politics, sprang to his feet with questions taken literally from the Hearst newspapers. The Mayor strove to make himself heard over the bubble and the pounding of Chairman Schwartz's gavel. The chairman asked the Mayor not to answer questions directed from outside the committee, but the Mayor insisted upon doing so. He prefaced his statements with the remark that nothing he would say could change Nelson anyway, but might help to inform other listeners.

The questions were typical of Hearst, Thompson and Hylan, full of innuendo and misstatements. A few hours before the meeting the Hearst afternoon paper came out with big headlines: "New Joker Found in Car Plan." The "joker" turned out to be the legal form of the referendum proposition for the purchase and operation of the lines, which is prescribed by state law. That the opposition is based on demagoguery is evidenced by the fact that the hostile element is as bitter toward the company as toward the city and never offers a constructive plan to replace what it seeks to destroy.

The Mayor declared the deal whereby the city sought to acquire the finest

traction system in the country without paying a nickel or obligating itself to pay a nickel regardless of the success or failure of the project was the most unusual in the history of finance. If the purchase fails, he said, the lines will be thrown into federal receivership in 1927.

"Chaos," he said, "will be at hand. Money could not be had and the lines would decay. We could not hope to get it out of receivership before 1930.

The Mayor departed when Chairman Schwartz told one of the intruding Aldermen that he had no time to waste on "a silly and insulting fool" and the row went on without the presence of the chief executive.

Chestnut Street Tube Ordinance Signed

Mayor Kendrick of Philadelphia, Pa., signed on Feb. 2 the ordinance authorizing the construction of the Chestnut Street surface subway under agreement between the city and the Philadelphia Rapid Transit Company. In a message to Council the Mayor told why he had signed the Chestnut Street ordinance. He quoted a record of approval of the subway project even extending back to the previous city administration. He explained that every dollar of the cost was to be returned to the city and said the project eliminated expensive proposals to widen the thoroughfare. Following the receipt of the message Councilman Walter, chairman of the transportation committee, moved suspension of the rules to place another transit ordinance on third reading and final passage. He then called up the ordinance granting the request of the Philadelphia Rapid Transit Company for permission, as the city's partner, to sell \$10,000,000 of bonds of the issue of 1912 and to increase the interest from 5 to 6 per cent. These bonds have been used chiefly as collateral for short-time loans.

In connection with the bond proposal Coleman J. Joyce, counsel for the company recently explained that 100 cars and 213 buses were to be purchased and that the first payment would be \$1,072,000. Next \$60,000 would be spent on shop equipment, \$128,000 on electric equipment and \$270,000 on extension of track. In addition, \$170,000 would be spent for improvements to tracks and other work in connection with the city street paving program. There would be \$1,700,000 as additional capital left for other improvements.

Rerouting and Through Routing in Pittsburgh

In a decision made public on Feb. 4 by Chairman Charles A. Findlay of the Pittsburgh Traction Conference Board, Pittsburgh, Pa., rerouting and through routing of cars of the Pittsburgh Railways, are authorized for a period of 60 days. This matter of short routing as proposed by the company has been the subject of discussion for many weeks. The board explains that the schedule which it has prepared has been arranged to maintain the best possible service for the largest number of riders, and at the same time to reduce as far as possible the number of cars passing

through the areas of greatest congestion.

The report stated that the unprecedented increase in vehicular traffic during the past few years had made it impossible to conduct a satisfactory system of transportation over the routes now operated in the congested section of Pittsburgh, because of insufficient street area. The opinion said that it was not unusual for a car with a schedule of 12 or 14 minutes to consume from 30 to 40 minutes in negotiating the congested area.

The rerouting plans offered two elements of possible relief: First, the introduction of fewer cars in the congested area of the triangle; and second, rerouting. The report stated that the changes involved in the proposed plans were advanced as a tentative method of meeting difficulties in the downtown section.

Following the announcement by the railway officials that the plans would be placed in effect "in about a week," the downtown merchants said they would "fight to the last ditch" to prevent the modified short looping plan.

Petition Filed for Buses in Richmond

The Virginia Railway & Power Company has petitioned the Common Council of Richmond, Va., requesting that body to adopt an ordinance granting the company permission to operate 8 bus routes extending to every section of the city and suburbs. The company says that if the Council acts promptly it is prepared to start its supplemental bus service as soon as the equipment can be obtained.

Coincident with the company's plan to obtain an ordinance, announcement was made that the Richmond Rapid Transit Corporation, an independent bus line, would fight to the limit the entry of a competitor in the motor transportation field. H. V. Godbold, vice-president of the corporation, said that his company would protest the granting of a permit; that he held a 30-year franchise, and that he stood ready to extend bus service to any part of the city that the Council might require. He said he believed that the Council would protect the interests of a pioneer in the local bus transportation field.

It is the contention of the railway that the ordinance requested by it would not necessitate any action for which the Council has not established a precedent. An official of the company pointed out that the Council had granted the Rapid Transit people permission to parallel the street car lines on Broad Street and that the railway company in turn was merely asking the right to parallel the bus lines in the West End section.

The railway company emphasized the fact that it was offering the public the bus-to-street-car transfers which the bus corporation was unable to meet. In the case of a transfer from a street car to a bus the passenger will be required to pay the difference of 2 cents between the fares. If the plan is adopted it is said that it will establish a remarkably inclusive transportation system, embracing the suburban sections of the city.

Important Improvements in Track at Montreal

Formal announcement has been made of some of the new work to be carried out by the Montreal Tramways, Montreal, Que., hinted at in the *ELECTRIC RAILWAY JOURNAL* for Jan. 24, page 162. Perhaps the principal work in sight during the coming season is for the relief of congestion in the downtown districts. For some time past the company had been considering plans to relieve congestion in the main arteries of trade downtown and these plans are now being considered by the Montreal Tramways Commission, the executive committee of the city and the officials of the company.

A terminal loop will be built around the Power Building on Craig Street, so that cars from east and west, as well as north, will turn around the new loop. A sheltered transfer station is to be built at this terminus.

In order to carry out this work, the tramway has bought the properties extending from the Power Building on Craig Street to Cote Street, and also at the northeast corner of St. Urbain and Craig for a distance up St. Urbain.

This will make room for cars to run on a loop from St. Urbain to Cote Street around the block, all cars on this loop stopping at the new covered waiting platform which is to be at the corner of Cote and Craig Streets, the old buildings now at that corner to be pulled down.

Franchise Discussion Revived in Columbus, Ohio

Members of the City Council of Columbus, Ohio, recently authorized Councilman Henry Worley, head of the utilities committee, to reopen negotiations with the Columbus Railway, Power & Light Company, Columbus, Ohio, in an effort to obtain a 25-year franchise, to become effective upon the expiration of the present contract on Feb. 1, 1926.

Representations of the city are agreed upon fixing a ticket charge based on the actual cost of carrying passengers plus a fair return on the property value. They also would have the rate question readjusted every 5 years. Another plan is to have present car lines extended according to the increase in population as against a maximum of 10 miles a year proposed by the company in a former meeting.

It is said that representatives of the city favor seeking to require the company to continue its former method of assisting in the paving of streets in which there are tracks by caring for the street between the rails as well as 1 ft. on each side.

Wages Increased.—P. J. Murphy, vice-president and general manager of the Lackawanna & Wyoming Valley Railroad, Scranton, Pa., known as the Laurel Line, recently announced an increase of 2½ cents an hour in the pay of trainmen retroactive to Dec. 1, 1924. He said that by the terms of the new scale the men of the Laurel Line would receive 69 cents an hour. A number of minor changes were made in the working conditions.

New Era in Utility Relations in Dallas

Dallas, Tex., has recently been through a period of inquiry with respect to the need for continuing the 6-cent fare on the lines of the Dallas Railway. The whole proceeding was most amicable, and this has led the *Dallas Dispatch* to contrast the present situation with the one that existed 10 years ago. That paper said that those who recall the acrimonious days of 10 years ago when the railway and light companies' affairs were a matter of the most intense public interest will read of the 6-cent fare hearing with interest and satisfaction. As that paper saw it, the outstanding feature of the inquiry was the frankness and directness of Messrs. Hobson, Meriwether, Worsham and others intimately connected with the management of the railway. The *Dispatch* said:

It was quite palpable they were dealing with the public's representatives openly and above-board. It is well. The city and the car company have the same aims. The city wants good service from a profit-making street car system. The company wants to give it because it knows that that is the real way to continued success. The city is willing to pay for good service and the company perhaps would not take a higher fare than 6 cents, even if it could get it.

The *Dallas Dispatch* has frequently said that the greatest contribution made to the development of Dallas in 20 years was the settlement of the public utility problems started by Henry D. Lindsley as Mayor. He lost his political life bringing about the present satisfactory conditions, and incidentally Dallas thereby lost its most valuable public servant and citizen. But the good that men do lives after them and this applies also to Henry D. Lindsley, now a resident of New York.

Another outstanding feature of the investigation was the dominance of the city of Dallas brought about by the unequaled public service of John W. Everman, city supervisor of public utilities, and his assistants. The people, the City Commission and the traction interest equally benefit by his demonstrated fitness for his position.

Approves One-Man Cars in Little Rock

A protest against the operation of one-man cars in Little Rock, Ark., was overruled by the Public Utilities Committee of the Little Rock City Council at a recent meeting. The report of the committee on the protest against the operation by the Arkansas Central Power Company of the lately installed one-man safety cars was brief and in favor of the use of the new cars. The report was adopted by a unanimous vote.

L. P. Newton, local attorney, representing the protestants, outlined the objection to the one-man cars. He contended that the use of the cars was an inconvenience to the public; that it interfered with the enforcement of the "Jim Crow" law and that the operation placed too much responsibility on one man.

Five motormen who have been operating the new cars since they were installed Dec. 25, testified that their duties were less burdensome than under the two-man system; that the schedule was being maintained without difficulty, and that they had experienced no trouble in segregating white and negro passengers.

The report of the committee said in part that after hearing all evidence introduced by both sides it was of the

opinion that, while there was some confusion and delay during the first few days in the operation of the cars, the company had eliminated the causes and the cars are now being operated on schedule. The committee was further of the opinion that the company was to be commended for its efforts to provide the most modern and adequate facilities.

New Idea in Coach Service

A no-transfer motor coach route from the Hill district to the business section of the City of Toronto, Ont., is to be started in the spring by the Toronto Transportation Commission. The service, which will consist of single-deck buses run at a 10-cent fare, will tap districts where patrons travel in their own cars. Heretofore, the bus has been used in Toronto merely as a railway auxiliary and has provided service on outlying routes in Rosedale. The new service will, in a sense, compete with the T.T.C., but actually it is designed to secure traffic which the tramway company does not now get at all. D. W. Harvey, general manager, said that this new service would be self-supporting and its accounts would be kept separately from the railway accounts. He said the purpose of the new line was entirely different from the company's bus activities in the past and it was his belief that inasmuch as the coaches would serve passengers who now use their own cars the downtown parking situation would be greatly relieved.

Buses Get Through When Railway Suspends

The New Jersey Interurban Traction Company, Washington, N. J., on Feb. 7 abandoned efforts to clear its line, discharged the men who have been shoveling snow and started a bus running between Port Colden and Phillipsburg. Three more buses are to be added. Permission will be asked of the Public Utilities Commission to extend the bus service to Hackettstown, 10 miles east of Washington, to Oxford and to High Bridge.

The trolley line, 20 miles long, was built 30 years ago. The original organization, the Easton & Washington Traction Company, went into bankruptcy. The road was taken over by the Northampton, Easton & Washington Traction Company and that in turn was superseded by the present corporation.

The trolley fare was 7 cents for each of the seven zones, but the rate will be increased to 10 cents on the bus.

Baltimore-Washington Bus Permit Refused

The Public Service Commission of Maryland has refused a permit for the establishment of a de luxe bus line between Baltimore and Washington. It holds that present transportation facilities are adequate and that the traffic on Washington Boulevard already is unduly heavy. The proposed bus line would have come into competition with the one electric line and the two steam railroads operating between the two cities.

Rates Working Out Satisfactorily

In its annual report submitted recently to Governor Silzer the Board of Public Utility Commissioners of New Jersey said that the rates now charged by the Public Service Railway were working out to the satisfaction of the public and to the advantage of the company better than would be the case had an attempt been made to overcome the deficit by charging a higher basic fare. The commission sees no improvement in the condition of street railway lines operating in and between the smaller municipalities. This it attributes to increases in operating costs, development of the bus and the increasing use of private automobiles.

The report says it is a matter of grave concern that several railways have been compelled to abandon franchises and discontinue service and that the largest company, the Public Service system, has failed to earn an adequate return under a system which the commission regards best adapted to conditions under which it operates.

More Rental Would Mean More Development

Thomas E. Mitten, chairman of the board of directors of the Philadelphia Rapid Transit Company, Philadelphia, Pa., recently offered the city of Frankford more "L" rental if the money were applied to improve land in the northeastern part of the city. The additional rental of about \$110,000 would begin in 1926 and would be sufficient to release \$13,000,000 of the city's borrowing capacity. The \$13,000,000 represents the city's investment in the construction of the "L." If these suggestions are carried out much unimproved land in that section of the city will be made available for homesite development. An additional rental of \$110,000 would bring the P. R. T.'s annual payment for the "L" to \$830,000. Its total additional payments during the remainder of the life of the 50-year bonds issued for the construction of the "L" would be about \$5,000,000.

Rochester in Throes of Bus Fight

Rochester has a miniature bus war, with the New York State Railways and the Ridge Road Bus Line as the contestants and the Common Council as the referee.

The Ridge bus line operates from Rochester to Hilton, over a 20-mile route. Recently the line ended its run at the union bus terminal in the heart of the city. The New York State Railways, contending that the bus company's franchise did not call for service within the city limits, caused the buses to be halted at the edge of the city. The traction company maintained that the bus men must obtain a state certificate or special franchise. James J. Dadd, secretary of the Auto Bus Association of New York State and manager of the bus terminal, met this statement with the charge that the railway has not furnished adequate transportation for the residents of the Ridge Road section. An ordinance which would allow the buses to end their run at the terminal has been introduced into the Council.

Monongahela-West Penn Operations Enlarged

Final steps have been taken in a plan which will link together in one system a number of the large electric light and power companies operating in West Virginia, Ohio and Maryland. To this end a consolidation and unification of all the electric light and power companies of the West Penn System within the three states had been effected. This was done through the transfer of the properties concerned to the Monongahela-West Penn Public Service Company. The properties and assets thus involved were of the Brooke Electric Company, which operates in Brooke, Hancock and Ohio Counties, West Virginia; the West Virginia and Maryland Power Company of Preston, Taylor, Barbour, Randolph and Mineral Counties, West Virginia; the Parsons Electric Service Company of Upshur County, West Virginia; the St. Mary's Power & Light Company, Pleasant County, West Virginia, and the West Maryland Power Company of Garrett County, Maryland.

The Monongahela-West Penn Public Service Company, already operating in Monongalia, Marion, Wetzel, Tyler, Wood, Harrison, Lewis, Barbour and Braxton Counties, West Virginia, and Washington County, Ohio, will be made by the acquisition of the largest public utility corporation in West Virginia. The West Penn Company, which is controlled by the American Water Works & Electric Company, Inc., of New York, is likewise the owner of the West Penn Power Company, the West Penn Railways and the Wheeling Traction Company, together with their subsidiaries. Operation and management of the enlarged Monongahela-West Penn Public Service Company will continue under the administration of Capt. George M. Alexander, president, with headquarters at Fairmont, W. Va.

Gasoline and Weight Tax Bills Passed in Michigan

The 2-cent gasoline tax bill and the 55-cent weight tax bill have been passed by both houses of the Michigan Legislature and will be given immediate effect upon signing of the Governor, considered a certainty. The weight tax bill taxes passenger cars 55 cents per hundredweight and trucks on a graduated scale from 65 cents per hundredweight up to 2,500 lb., to \$1.25 on trucks of more than 6,000 lb. The weight tax is expected to raise about \$14,500,000 and the gas tax about \$6,500,000.

Carhouse Held Up at Chicago

Desperadoes staged a spectacular robbery in the Chicago Surface Lines Leavitt Street carhouse early in the morning of Feb. 2. They are said to have got away with \$9,000, the receipts of late Saturday and Sunday. At 2:30 o'clock in the morning the leader slid off a 10 ft. steel inclosure, dashed through three offices and confronted David Jones, cashier, with a gun. Six other bandits followed. They slid the nickels, dimes and other coins into canvas bags, tied them and passed them outside. Two conductors in the next

room would have known nothing of the robbery but for a rifle pointed at them while the bandits worked. The robbery is the first of its kind in Chicago since the notorious trio of 1903 killed two employees and two detectives and withstood a long siege in the Indiana dunes. In the round-up following the recent robbery three former employees of the lines were arrested.

Effective Good-Will Ad in Atlanta

As part of its campaign of general public utility advertising the Western Electric Company recently used in the Atlanta, Ga., papers copy that was distinctly appropriate. The appeal to



Better mix a few street cars in the mortar

YOU who are planning homes in the suburbs, should look on the street car as part of the very foundation. Dependable and serviceable it is to do with your satisfaction as your home—and its resale value.

That's only another way of saying that it will pay every Atlantian to see to it that the street car company is put on a basis where they can extend and improve service.

Back up the company and they will play a very considerable part in the expansion of Atlanta—bringing more people, more industries, more prosperity to our city.

Western Electric Company

Some Facts for the Public to Ponder

Atlantians was to mix a few street cars in the mortar of new construction. The ad carried its own message, the purport of which was that it would pay every Atlantian to see to it that the railway is put on a basis where it can extend and improve service.

Claim Agent Discusses Fakers in Daily Paper

Trevor C. Neilson, claim agent of the East St. Louis & Suburban Railway and related lines, East St. Louis, Ill., and president of the Mid-West Claim Agents' Association, was interviewed recently by James B. Clendenin of the East St. Louis *Daily Journal* on the subject "How Accident Faker Preys Upon Street Railways." He reviewed a number of accident cases entitled to a settlement for claims and some of the false ones that were either perpetrated or attempted. In the course of his article Mr. Clendenin said:

And despite the machinery that is at work in the war on fakers, some of them still get away with it, but not in the numbers of former years, in which there was no satisfactory contact between the claims departments of the various utilities.

While any number of the evils of antiquated systems of handling claims have been remedied, a number still exist that only the legislative branch of the state government can eliminate, it is Neilson's opinion. The most stubborn obstacles still in the way to a fair settlement for both sides is the Illinois law which makes it impossible for the defendant to force a medical examination in cases where claims are made for physical injuries.

Cities of New York State Favor Bus Bill

The legislative committee of the New York State Conference of Mayors, at a meeting held at Albany on Feb. 5, went on record as favoring the "purpose and principle" of the Walker-Bloch municipal bus bills which, introduced at the request of the Hyman administration, would give to New York and other cities the right to own, operate or lease municipal bus lines. The 5-cent-fare provision did not meet with the approval of the entire committee. The committee opposed a bill which would make the officials of any city individually liable for damages caused by buses which were being operated without a certificate from the Public Service Commission. This measure is said to be aimed at the Hyman buses in New York, which are being run without the consent of the Transit Commission or the Public Service Commission.

Trainmen at San Diego Receive \$10,870 in Accident Awards

Claus Spreckels, vice-president and general manager, recently presented to the trainmen of the San Diego Electric Railway, San Diego, Cal., checks totaling \$10,870 as a prorated bonus based upon each man's accident record for the year just closed. Thirty of the men were rated at 100 per cent. Each received a check based upon the hours he had served during the year.

The gifts were distributed at a meeting that followed a dinner by Mr. Spreckels to the department heads at the San Diego Hotel. A feature was the presentation for Mr. Spreckels of two beautiful watches to J. C. Boronda and T. H. Bailey, in celebration of their completion of 20 years of service with the company. The presentation was made by M. J. Perrin, who recently started his 38th year of service with the company.

Mr. Spreckels presided. He pointed out that it is the aim of the railway to assist in the city's growth by furnishing transportation that will permit the city to expand and attract additional population. He said that the railway can prosper only as the city prospers. Part of his plea follows:

You employees can influence the growth of our city, the success of the company, and consequently your own prosperity more than you realize. The ballot is one of your most effective tools. When you cast your votes in any city election, do it with the single idea of benefiting the whole city. Do not consider an individual personal benefit which may jeopardize the general welfare.

In your public relations, too, you can help San Diego grow. Choose the right men to govern the city; help them with your ballot to make it grow; give the public the best that is in you, and your little piece of real estate or your job will be worth more. You will profit, and so will the company. And the city will profit most of all.

Large Capacity Buses Under Consideration in Seattle

Plans for equipping feeder lines to the Seattle Municipal Railway, Seattle, Wash., with buses like those now in use in Chicago, Detroit, New York City and other Eastern cities have been laid before the Seattle City Council by representatives of one of the bus builders.

News Notes

Bus Operation in Greensboro.—The Greensboro Bus Company, a newly organized subsidiary of the North Carolina Public Service Company, Greensboro, N. C., recently started the operation of three buses supplementing its railway service. The bus service will accommodate residents in this vicinity not reached by railway lines. Buses are of the latest 22-passenger street car type, manufactured by Graham Brothers of Detroit. The fare on the buses is 10 cents, and free transfers are given passengers from buses to the street cars. A charge of 3 cents will be made when passengers enter the bus with a transfer received from the street cars at Jefferson Square.

Serious Accident on "L."—Two people were killed, six seriously injured and 50 received treatment for bruises when a southbound five-car shuttle train of the Interborough Rapid Transit Company telescoped another train early on Feb. 9, ramming into a stationary Third Avenue "L" express on the White Plains Road. The train was traveling through a very heavy fog which hid a sharp incline leading down to the 219th Street station. The collision caused a tie-up in service of 6 hours. Engineers of the company declared that the veteran motorman who lost his life had been guilty of violating a rule of the company which prescribes strict conditions for operation during a fog.

Indianapolis Company Purchases Bus Company.—The Indianapolis & Cincinnati Traction Company, Rushville, Ind., has purchased the Indianapolis-Shelbyville bus line from its owners, Harry J. Lay of Ridgeville, Ind., and Roy C. Lee of Shelbyville, Ind. Hudson R. Biery, assistant to Charles L. Henry, president of the traction company, said that aside from giving the public better service on the bus line little change would be made in its operation. Eight trips each way are made daily by the bus line.

Buses Will Supplant Railway Cars.—Notices have been posted in the cars of the Cumberland & Westernport Electric Railway that within the next 60 days railway service will be discontinued on the run between Frostburg and Cumberland, Md., in favor of bus service. Railway service on the Frostburg-Westernport end will be continued.

Bus Privilege Extended.—The Oskaloosa Traction & Light Company, Oskaloosa, Ia., has been granted a 90-day extension of the bus privilege now operative in First, Fifth and Fourth Wards. The extension was granted pending the placing of a franchise amendment before the voters of the city at a special election to be held as soon as it can be lawfully handled.

Official Takes Vacation.—Thomas N. McCarter, president of the Public Service Corporation, Newark, N. J., and Mrs. McCarter sailed on the S.S. *Rotterdam* on Feb. 4 for a trip to the Mediterranean. They will be gone until about April 15. This is the

longest vacation Mr. McCarter has taken in 35 years. He plans to leave the ship at Naples and motor to Paris, then to catch the *Rotterdam* at Boulogne to rejoin the cruising party.

Rapid Transit Course to Be Given.—Another institution which feels the need of offering instruction in rapid transit development is the College of the City of New York, School of Technology. This school will offer a special course in rapid transit and traffic, according to an announcement of Dean Frederick Skene. Aside from the study of construction of new lines, especially underground, emphasis will be placed on the means whereby the present trackage can be made most useful. The Board of Transportation, through Commissioner Delaney, its chairman, has approved the course and recommended George Abraitys, chief of the designing division of the board, to give it.

Line Will Continue.—The Washington-Virginia Railway, Washington, D. C., will be continued in operation indefinitely. This was decided on Feb. 5 by a committee representing about 90 per cent of the bonds outstanding. It had been expected that the line would discontinue operation following the granting of a permit to R. L. May to operate buses between Alexandria and Washington and the subsequent denial of a similar permit to the railway by the Virginia Corporation Commission. The company has asked a permit to run the bus line between Alexandria and Washington as a feeder for the cars which are operated to Fairfax, Falls Church and Mount Vernon.

Bus Permit Extended.—The Charleston Interurban Railway, Charleston, W. Va., was recently granted a 4 years' extension on a permit by the City Council for operation of a bus line to the Upper Glen Elk district of the city. Originally the permit was for one year. The company did not consider a one-year permit sufficient to warrant the necessary investment of more than \$25,000 that would be involved to provide adequate equipment.

Interurban Meets Steam Line Rate.—The Illinois Commerce Commission has authorized the Illinois Traction System to publish on one day's notice a rate of 91 cents per ton on coal shipments between Springfield and Decatur, Ill. This is a reduction of 10 cents and permits the interurban line to meet the steam railroad rate.

Conference to Discuss Transit.—The Cincinnati, Ohio, Rapid Transit Commission has adopted a resolution inviting representatives of the Cincinnati Street Railway and the Cincinnati Traction Company to a conference to be held on Feb. 20 for the purpose of discussing the transit situation. The resolution was offered following a statement by John V. Campbell, attorney for the commission, who said that he thought representatives of the two groups should be asked to discuss the leasing of the transit loop. Any agreement reached would have to be first submitted to the Council and later to a popular referendum. This referendum might be held during the August primary, and could certainly be held at the November election.

Experiments with Sunday Pass.—Because receipts on Sundaya fell far below the cost of operation, the Charleston Consolidated Railway & Lighting Company, Charleston, S. C., recently started the Sunday pass, as an experiment for 10 Sundays. The passes are sold for 25 cents each.

Wage Increase Sought in Des Moines.—An increase in wages has been suggested by trainmen of the Des Moines City Railway, Des Moines, Iowa, when the present agreement expires on March 1. The present scale is based on a 59-cent hour with insurance and pension features secured under an arbitration board recommendation last year. The company contends that there can be no reduction in fares as long as operating expenses continue at the present level. F. C. Chambers, president of the company, has suggested increased use of one-man cars and the co-ordination of buses with the railway.

Employees 100 per Cent for Safety.—All operators of the cars of the Knoxville Power & Light Company, Knoxville, Tenn., have enrolled in the Safe Drivers' Club, which was recently organized, the total membership of which is now 305. The red emblem recently appeared on the windshields of autos and street cars on the streets of Knoxville, indicating that owners and operators are members of the club, and that their aim is to reduce the number of accidents. Formation of the club was urged by the Knoxville *Sentinel* in conjunction with the Knoxville Automobile Club.

Railway Refused Bus Certificate.—The Public Service Commission has refused the application of the Mauch Chunk & Lehigh Transit Company, Mauch Chunk, Pa., for a certificate to operate a bus line between Mauch Chunk and Weissport. The commission said that the company's application was for operating rights over a route already provided with service by George Arner. The railway sought to discontinue its line from Flagstaff Park to Mauch Chunk and Lehigh.

A More General Bill to Be Introduced.—Instead of the bill recently introduced to permit the Jacksonville Traction Company, Jacksonville, Fla., to operate buses charging a fare of 10 cents, the laws and rules committee of the City Council will recommend an amendment to the present "jitney bus" ordinance which will allow any one to operate buses provided operators execute a bond for the protection of property and passengers. It is expected that the bond will be \$5,000.

Weekly Pass in Leominster.—The weekly pass has been put into effect by the Worcester Consolidated Street Railway in Leominster, Mass., for a trial period of 3 months with the approval of the Massachusetts Public Utilities Department. The plan provides for the issuance of a pass at a cost of 75 cents. The city of Leominster, with a population of 20,000, has a 7-cent fare from the center to limits beyond the edge of town, or 14 cents across. The pass is good for a limited area around the center sufficient in extent to take care of practically all riding from factories, offices, stores and homes.

Foreign News

New Zealand Property Has Successful Year

Christchurch Tramway, Christchurch, N. Z., had a deficit in its operations for the year ended March 31, 1924, of about £7,000, which will be more than covered by the amount carried forward. Christchurch Tramway, the largest tramway undertaking in the dominion, consists of 78 miles of single track and has an annual revenue of approximately £261,000. As it is a publicly owned concern, it is the policy of the Tramway Board not to make a profit, but so to arrange its finances as to produce the barest possible surplus, at the same time stating that the trams must pay their way and not become a burden on the rates. On March 31, 1922, there was a surplus of £4,009. At the same date in 1923 it was £6,527, giving a total of £10,536 and leaving a balance of £10,271 carried forward to the 1924 account. The number of car-miles run was 3,374,000, a decrease of about 84,000. The passengers carried totaled 25,450,000, an increase of about 350,000.

In his report, which antedated the closing of the year by about one week, A. S. Taylor, chairman of the Christchurch Tramway Board, discussed at length the fare situation in the past and offered some suggestions for the future. On the subject of bus competition he said the board's experience in that direction had not been a fortunate one, and further, that losses had been made both on the Hornby and South Brighton buses. He suggested the board considering the advisability of obtaining a fleet of half a dozen buses which could be used to test new routes.

Electric Buses for Lyons

Tramway service in Lyons, France, has recently been supplemented by the establishment of a bus line, after consideration of several types of vehicles. During 1923 a test was made of an electric storage battery bus of a type similar to those in use in Rome, Milan and other Italian cities. Following this successful trial it was decided to adopt substantially the same design for the new vehicles.

Electrical equipment was furnished by Rognini & Balbo of Milan and the mechanical equipment by De Dion-Bouton. This storage battery bus has five forward and two backward speeds. The speed is varied by changing the motor connections without making any change in the mechanical transmission. The controller is actuated by a pedal. Power is furnished by two motors mounted just back of the rear axle, one motor driving each rear wheel. Seats are provided for 28 passengers, while standing space for 12 more is provided on the rear platform. The bus is operated by two men, the driver being in a closed compartment at the front.

The new service was inaugurated by M. Herriot, now Premier of France,

and formerly Mayor of Lyons, on the fifteenth anniversary of the electrification of the suburban lines.

British Tramway Statistics

There are 243 tramway undertakings in Great Britain, operating 2,624 miles of track, according to the annual return of the Ministry of Transport for the year ended Dec. 31, 1923, for municipal properties, and March 31, 1924, for privately operated companies. Of this number municipal authorities operate 170 undertakings, comprising 1,839 miles of track, and 73 companies, totaling 785 miles of track, are privately operated. The capital expended by local authorities was £71,341,947 and by private companies £20,876,610, the total being an increase of £3,128,053 as compared with the previous year. The total gross receipts were £29,433,647 and the expenditures £22,882,028, leaving net receipts of £6,551,619, or a decrease of £880,999 as compared with the previous year.

The net income available for distribution was £7,956,147, out of which £2,195,039 was appropriated for interest and dividends, £1,913,930 for payment of debts and £2,143,066 for reserve and renewal funds.

The number of passengers carried was 4,443,326,581, an increase of 2.18 per cent; the number of car-miles operated, 363,057,881, an increase of 3.17 per cent, and an increase of 5.31 per cent in electric energy used. The average receipt per passenger was 1.53d. as compared with 1.66d. the previous year.

The municipal tramways received from local rates the sum of £256,777 and contributed in relief of rates £280,537. The tramways requiring most help were those of municipalities in the outskirts of London, where bus competition is intense. West Ham required help to the extent of £63,000; East Ham, £35,000; Croydon, £18,000, and Walthamstow, £15,000. Of the tramways operating at a profit the most successful were Leeds, which contributed £65,000 to the relief of local rates; Birmingham, £27,000; Cardiff, £22,000; Hull, £21,000, and Blackpool, £15,000.

Travel in Berlin Falls Off

During the first 11 months of 1924 passengers on the various transportation lines in Berlin, Germany, numbered a little more than 1,231,400,000.

THOUSANDS OF PASSENGERS CARRIED IN BERLIN, JANUARY TO NOVEMBER, INCLUSIVE

	1924	1923
Stadtbahn.....	565,000	850,000
Elevated and subway.....	162,000	153,589
Surface railways.....	462,800	278,476
Omnibuses.....	41,635	21,730

This was a slight decrease from the 1,304,693,000 of the previous year. There were very notable changes, however, in the distribution of this travel, as shown by the accompanying table.

New Route Number System for Glasgow

A new system of route numbers on the municipal tramcars of Glasgow, Scotland, came into use on Oct. 1, 1924. These numbers, which are displayed at the top of the center vestibule window at either end of the car, indicate the destination as well as the route. For example, on the Ronken Glen route all cars turning at Shawlands, the nearest terminal from the center of the city, display the number 2. Cars turning at Newlands show 2A, at Merrylee 2B, at Giffnock 2C, and those going all the way to Ronken Glen show the number 2D.

The numbers are also being displayed at the most important stopping places, and a small map showing the numbering of each route has been prepared for the public.

Paris Metro Subway Fined. — The Metropolitan and Nord-Sud subways in Paris have been fined 600,000 francs for their failure to supply their temporary employees, as well as regular employees, with old-age pension books. The case has been in the courts for more than 2 years, but unless the companies appeal further the matter is now settled.

British Tramway Abandonments. — Buses are to be operated by the Sunderland District Tramways Company, Sunderland, England, the tramway rails removed and equipment sold, due to the bad condition of the equipment. Trackless trolleys will be substituted for tramways in Chesterfield. It would cost approximately £90,000 to put the tramways into proper repair and renew the rolling stock, while the cost of the trolley bus system is estimated at £39,000.

Weekly Pass Successful in Hull, England.—The number of weekly passes sold by the Hull Tramways has increased from 2,453 in the first week to 4,600 in the last week for which figures are available. The total tramway receipts, which had been decreasing, now show an increase over the corresponding weeks of the previous year. Reference to the installation of the pass in Hull was made in ELECTRIC RAILWAY JOURNAL, issue of June 14, 1924.

Bradford Proposal for Relief of Congestion. — Construction of terminal sidings near the curb at fare stages, with the necessary deflection of the car tracks, is now being considered by the Town Council of Bradford, England. It is thought that this will reduce obstruction to general vehicular traffic, caused by stationary tramcars in the middle of the street, thus relieving traffic congestion in a measure.

Electric Buses to Be Tried in Paris. —The Paris Transports en Commun is to experiment with a new storage battery bus, of the same type as those put in service in Lyons last October. It is expected that the electric bus will serve for suburban traffic running from the big centers, rather than general interurban traffic. The disposition of the French to develop the electric vehicle is to secure freedom from foreign sources of supply for liquid combustible.

Financial and Corporate

Denver Reorganization Progressing

Committees Are at Work on Plans for Discontinuing the Receivership—Earnings Greatly Improved

Representatives of the stockholders, the holders of a defaulted \$10,107,750 bond issue and holders of approximately \$2,500,000 in notes of the Denver Tramway, Denver, Col., are working on the formulation of the reorganization program for the company. Tentative plans have been advanced to effect the rehabilitation on the basis of an assessment of \$10 on each share of the \$5,948,000 of stock outstanding, cutting the bonded indebtedness of \$10,107,750 in half by substituting \$500 in stock and a new \$500 bond for each \$1,000 bond of the defaulted issue and by the creation of an issue of preferred stock to be given to the holders of the collateral trust notes to the amount of \$2,498,000 now outstanding. Other issues would apparently be left undisturbed.

Ernest L. Stenger, who has been in charge of the company as receiver, has been mentioned for president under the contemplated reorganization.

Interest has been paid during the receivership only on underlying securities. Interest has been defaulted on the first and sinking fund 5s, on the 7 per cent notes and on a \$278,100 issue of Denver & Northwestern first and collateral bonds of 1932.

The net income of the company for 1924 was \$261,000, as compared with \$199,842 for 1923, a gain of 31 per cent.

It will be recalled that the federal court recently ruled that the city of Denver should be permanently restrained from enforcing fare contracts and ordinances and that the court construed the company's franchise as perpetual. At the same time the valuation of the company was fixed at a figure which permits the earning of a sum sufficient to warrant continuation of the present 7½ and 8-cent schedule.

Bearing on the movement for the reorganization is the fact that the company has shown a deficit only four months during the receivership and that its average net earnings have been \$200,000 a year.

During that period interest amounting to \$2,776,000 has been defaulted on bond issues, but \$2,750,000 has been spent upon improvements and renewals.

Engineers Buy Attleboro Road

The Interstate Consolidated Street Railway, Attleboro, Mass., was sold at receiver's sale on Jan. 30, to Hemphill & Wells, New York City. This firm has also concluded negotiations for the purchase of the Attleboro Branch Railroad. It is planned to operate both properties as a single system. The two properties operate 30 miles of track.

The proposed new company will be a local industry under local management, including local business men among its directors. George W. Wells will be vice-president and general manager.

The firm of Hemphill & Wells consists of Albert W. Hemphill and Gardner F. Wells, who formed a partnership 6 years ago as consulting engineers specializing in public utilities. Both are Massachusetts Institute of Technology men and both were formerly with Stone & Webster. They are convinced that the Attleboro system can be put on its feet and made a permanently successful enterprise by applying modern methods.

The companies at Attleboro are operating, in conjunction with the United Electric Railways, Providence, R. I., two through bus lines. One of these runs between Attleboro and the center of Providence and the other connects Plainville, North Attleboro and the center of Providence.

It is planned to establish permanent bus service from Attleboro and North Attleboro to Pawtucket and Providence. This service will be co-ordinated with the trolley service.

Traffic and Revenue Lower in London, Ont.

The gross earnings of the London Street Railway, London, Ont., for the year ended Dec. 31, 1924, were \$665,302, a decrease of \$28,109 compared with 1923. This fact was disclosed in the report of the company submitted at the annual meeting on Feb. 4. The operating expenses were \$546,364, a decrease of \$25,718. Net earnings from operations were \$118,938. After the deduction of fixed charges, depreciation and Dominion income tax, the balance of net income was \$33,903. In 1923 this item was \$42,166.

Although the net income for 1924 was \$33,903, being an earning of 5.32 per cent of the outstanding capital stock, no dividends were paid for the year. On a mileage basis, the revenues show a decrease of six-tenths of a cent per mile operated as compared with the revenues per mile received during 1923. Charles Currie, president of the company, said that the funds representing the net income were used for capital improvements to the property. The company continued its policy of making improvements to its property, reconstructing and relaying trackage wherever the occasion demanded. The equipment was augmented by the purchase of two Peter Witt cars, making five cars of this type now in operation. Approximately forty cars were repainted during the year. In 1924 the number of passengers carried was 13,299,634, against 13,865,148 in 1923. The total number of passengers, including transfer passengers, was 15,048,868 in 1924 and 15,647,343 in 1923. The railway operated 36.10 miles of track.

Scope of Recent Merger

United Light & Power Company Largely Expanded by Continental Gas & Electric Purchase

Reference has been made several times recently in the *ELECTRIC RAILWAY JOURNAL* to the purchase negotiations by which ownership of the Columbus Railway, Power & Light Company, Columbus, Ohio, would pass to the Continental Gas & Electric Corporation interests and so to the United Light & Power Company. Other phases of the negotiations for the expansion of the activities of the United Light & Power Company are of interest.

Some little time ago the United Light & Power Company announced through its president, Frank T. Hulswit, that the company had acquired more than 75 per cent of the outstanding common capital stock of the Continental Gas & Electric Corporation, which controls, through stock ownership, among other valuable properties, the Kansas City Power & Light Company and the Columbus Railway, Power & Light Company. In turn the United Light & Power Company offered to acquire all of the remaining outstanding common shares of the Continental Gas & Electric Corporation, in exchange for its class "B" preferred stock and class "A" common stock.

OPERATIONS ENLARGED

It was stressed in recent statements that the consolidation brings together a number of men who have been long associated with the successful management and operation of public utility enterprises in the Middle West, of whom several will be included on the board of directors of the enlarged company, including C. S. Eaton, Cleveland, Ohio; Joseph F. Porter, Kansas City, Mo., and Rufus E. Lee, Omaha, Neb.

The United Light & Power Company, succeeding a company of similar name organized in 1910, owns all or a very large amount of the common stocks of the following companies: Continental Gas & Electric Corporation, the Tri-City Railway & Light Company, the Chattanooga Gas Company, the Fort Dodge Gas & Electric Company, the Cedar Rapids Gas Company, the Peoples Gas & Electric Company, the Ottumwa Gas Company and the La Porte Gas & Electric Company.

The greatest interest to readers of the *ELECTRIC RAILWAY JOURNAL* attaches to the groups embraced in the properties of the Continental Gas & Electric Corporation and the so-called Tri-City group. The Continental group includes the railway properties at Columbus, Ohio, and in Lincoln, Neb. Both of these are very recent purchases. Only within the last few weeks has the Lincoln deal been approved by the State Railway Commission. It contemplates the merging of the Lincoln Gas & Electric Company and the Lincoln Traction Company. Holders of the preferred stock of the Lincoln Traction Company were offered 50 cents on the dollar in cash or 60 cents on the dollar in Continental Gas & Electric preferred for their holdings. The basis on which the common stock was acquired has not been made public. At

one time this common commanded a price of \$80 a share, but before the purchase by the Continental was made it was offered in small lots at \$5 a share. For 5 years no dividends were paid on the preferred stock, but the accumulated dividends were liquidated some time ago by their payment in additional preferred. Dividends were then resumed, but the last payment was made in 1923.

The headquarters of the Tri-City Railway & Light Company are at Davenport, Iowa. This company through its subsidiaries operates all of the public utilities in Davenport, Muscatine and Iowa City, Iowa; Rich Island, Moline, East Moline and contiguous territory in Illinois.

Public Directors Named for New York Railways

The New York Transit Commission has nominated Samuel L. Martin and George B. Gibbons as public directors of the reorganized New York Railways, New York City. The naming of public directors on the reorganization of existing companies is in pursuance of the policy of the commission carried out in the cases of the Interborough Rapid Transit Company and the Brooklyn-Manhattan Transit Corporation.

Mr. Martin is a native of Virginia. After some business experiences, he was secretary to George McAneny when he was president of the Borough of Manhattan. Later Mr. Martin was executive secretary to Mayor Mitchell. During the war he was connected with the work of the War Trade Board in Washington and Japan. Since that time he has been in the insurance business. Lately he has been vice-president of the United States Merchants & Ship-ers Insurance Company.

Mr. Gibbons is the head of the municipal bond investment house of George B. Gibbons & Company, New York. He was born in Detroit, Mich., but has been a resident of New York for more than a quarter of a century. He was an officer in the New York National Guard for many years and a captain in the 104th Field Artillery of the 27th Division, in France, during the war.

Good Showing Made at Schenectady

A marked improvement in the financial operation of the Schenectady Railway, Schenectady, N. Y., for the quarter ended Dec. 31, 1924, over the corresponding period of 1923, is shown in the report filed with the public service commission. The net corporate income increased more than \$200,000.

REPORT OF SCHENECTADY RAILWAY FOR DEC. 31 QUARTER

	1923	1924
Operating revenues....	\$383,862	\$422,633
Operating expenses....	527,216	321,738
Net revenue	*\$144,354	\$100,895
Taxes assignable to railroad operation	26,475	25,004
Operating income	*\$170,829	\$75,891
Non-operating income	605	495
Gross income	*\$170,225	\$76,386
Fixed charges	45,061	54,320
Net corporate income.*	\$215,285	\$22,065
*Loss.		

Traffic Continues to Decline

Expenses of Washington Company Decreased—Money Used Liberally for Reconstruction

For the year ended Dec. 31, 1924, the balance of income of the Washington Railway & Electric Company, Washington, D. C., credited to profit and loss was \$256,749. To this was added miscellaneous items making the total credited to profit and loss during the year \$258,036. In 1923 the total was \$287,906.

These figures were all contained in President Ham's report presented to the stockholders at the annual meeting on Jan. 17, 1925. During the year the company carried 77,786,675 revenue passengers and 23,613,607 transfer passengers, a total of 101,400,282. This represented a decrease of 3,731,932 revenue passengers compared with the

CONDENSED STATEMENT OF WASHINGTON RAILWAY & ELECTRIC COMPANY, 1924

Gross earnings from operation..	\$4,759,243
Miscellaneous income (including dividends from Potomac Electric Power Company)	858,802
Gross income	\$5,618,046
Operating expenses (including depreciation), taxes and miscellaneous charges	3,820,621
Interest on funded and unfunded debt	790,675
Payment of dividend on 5 per cent preferred stock	425,000
Payment of dividend on common stock (5 per cent).....	325,000
	\$5,361,297
Balance of income for year 1924, credited to profit and loss	256,749
Miscellaneous items credited to profit and loss	1,287
Total credited to profit and loss during the year	\$258,036

preceding year. Passenger travel has been falling off steadily from the peak, which was reached in the spring of 1920. In 1919 91,488,735 revenue passengers were carried, the greatest number in any single year in the history of the company. The result for 1924 represents a decrease of 13,702,060. This has been due principally to the reduction in governmental activity releasing many employees, the increased use of the private automobile and competitive bus lines.

While operating revenues of the company have fallen off \$271,534 as compared with the preceding year, reductions in operating expenses totaled \$241,028. Although every effort was made to operate the company economically, yet with the large decrease in revenue passengers and the present fare of 8 cents cash or six tokens for 40 cents, it was impossible for the railway to earn a reasonable return on the value of its property even as fixed by the Public Utilities Commission.

Although the earnings were insufficient, the policy of liberal expenditures for maintenance and reconstruction was continued. On this work, and on general repairs and on the allowances for depreciation, \$966,458 was spent.

During the year recently ended 10 new cars of the pay-within type were

placed in operation. Thirteen of the pay-as-you-enter type were converted into pay-within type cars and eight buses were added to the transportation equipment, making the total number of buses now in operation 23. While the operation of buses has not proved compensatory the company adheres to its policy to establish such bus lines as may be necessary. It has repeatedly expressed its willingness to start such lines for the public convenience, believing that the public is best served by the operation of buses in co-ordination with the railway.

The report referred to the splendid results of the safety campaign which was started several years ago. Although the streets seem very much congested due to the great increase in the number of automobiles, accidents have been greatly reduced and the claims situation materially improved.

The company sold on July 17 \$2,496,000 of its general and refunding mortgage 6 per cent 10-year gold bonds dated Nov. 1, 1923. These bonds were sold to retire \$1,000,000 of 6 per cent 5-year general mortgage bonds which matured Dec. 1, 1923, and to provide additions to plant and equipment up to June 30, 1923. The Washington Railway & Electric Company also obtained authority from the Public Utilities Commission under date of Dec. 11, 1924, to issue and sell \$1,850,000 of its general and refunding mortgage 6 per cent 10-year gold bonds, dated Nov. 1, 1923, for the purpose of retiring a similar amount of Metropolitan Railroad first mortgage 5 per cent bonds which matured Feb. 1, 1925. These bonds have not yet been sold.

The total outstanding bonded debt of the Washington Railway & Electric Company and subsidiary companies, including the Potomac Electric Power Company, is now \$31,350,750. This added to the \$15,000,000 of capital stock of the parent company and \$95,350 outstanding capital stock of subsidiary companies makes the total outstanding capitalization at this time \$46,446,100.

The total payroll for 1924 of the Washington Railway & Electric Company and subsidiary companies, including the Potomac Electric Power Company, was \$4,281,217, an increase of \$95,496 over that of the preceding year.

The accompanying table shows the condensed statement for the year 1924, subject to revision upon final audit.

Philadelphia's Mistaken Attitude

A recent issue of "Service Talks," published by the Philadelphia Rapid Transit Company, Philadelphia, Pa., reminds the public that under the 1907 agreement the city is to divide equally with the company any earnings above the amount necessary to pay 6 per cent dividends, cumulative, on the \$30,000,000 of stock. The stockholders, however, thus far are \$20,000,000 short of having received the dividends contemplated. "Service Talks" says:

Almost every move the company has made to reduce costs or increase revenue has been mistakenly fought by the city. Since all excess earnings over 6 per cent, cumulative, must be divided fifty-fifty with the city, there would seem to be every reason why the city should, in self-interest, now co-operate with men and management in a supreme effort to make city built transit self-supporting.

Massachusetts Property Nearing Desired Goal

The Worcester Consolidated Street Railway, Worcester, Mass., netted enough income in 1924 to pay a dividend of 5 per cent on its stock, according to President Clark V. Wood. This will result in putting the company into the class of public utilities the bonds of which may be held legally by Massachusetts savings banks. This statute provides that a street railway must pay dividends for five consecutive years before its bonds get into the savings bank class. The Consolidated, after a series of years with no dividends, has paid them now for 2 years. Operating receipts in 1924 were about \$570,000 less than in 1923, but operating expenses in 1924 were reduced about \$450,000 over 1923. In other words, the net revenue in 1924 was about \$120,000 less than in 1923. Labor costs were advanced by wage increases granted by the arbitration board under the agreement which expires in the spring, but the working forces were reduced and one-man cars substituted for two-man cars wherever feasible.

Abandonment in Hudson Opposed.—Opposition of the city of Hudson, N. Y., to the proposed abandonment by the Eastern New York Utilities Corporation of its local tracks in Hudson east of Seventh Street was registered at a hearing on the company's petition before the Public Service Commission on Feb. 10. James A. Connell, assistant treasurer and auditor of the company, submitted compilations of figures showing the decrease in the number of passengers and revenue from the local line in recent years.

Revenue Statement Submitted.—The first report of earnings, as required by the Wisconsin Railroad Commission when it ordered an increase in rates on the lines of the Madison Railways, Madison, Wis., was submitted by that company recently. Total revenue passengers for January, 1925, aggregated 616,956, while the gross passenger revenue was \$39,779, the report reveals. The report further shows that the average revenue passengers for January during the 4-year period 1921 to 1924 aggregated 679,608. The average passenger revenues during the same month in the same 4-year period totaled \$39,647.

Municipal Line Shows Slight Profit.—Officials in charge of the Greenfield & Montague Street Railway, Greenfield, Mass., report the 5 months of operation in their charge, August to January, show receipts over expenditures to be \$1,135. Of this money 85 per cent has been returned to the towns in the so-called transportation area, giving \$668 to Greenfield and \$295 to Montague. The surplus of \$170 is kept in the treasury. The total income for the 5 months was \$31,496 and the expenses \$29,371. A reserve of \$500 is carried for contingencies, \$1,300 for depreciation and \$800 for operation. Operation under this general scheme was described at length in the *ELECTRIC RAILWAY JOURNAL* for Jan. 10, page 59, in which same issue the matter was discussed editorially.

Authorizes Discontinuance of Division.—The Public Service Commission recently granted the petition of the Olean, Bradford & Salamanca Railway, Olean, N. Y., for permission to discontinue the operation of its Little Valley division, remove its tracks and dispose of its right-of-way. The evidence showed that the line was operated at a loss of \$6,933 during the year 1923, taking no account of depreciation, and that the revenues had been steadily declining for the past 6 years. The railway is preparing to acquire and operate a bus between Olean and Little Valley. The commission's order requires that the railroad restore the pavement in Rock City Street, Little Valley, and the state highway to as good condition as the adjoining portions.

Order of Foreclosure Entered.—An order of foreclosure against the Joplin & Pittsburg Railway, Pittsburg, Kan., was issued by the United States District Court at Kansas City, Mo., Jan. 31. The order was requested by the holders of the first mortgage bonds.

Mr. Insull Resigns a Directorship.—Samuel Insull has withdrawn from the board of the Chicago City & Connecting Railways Collateral Trust, Chicago, Ill. No reason was announced, but Mr. Insull is said to have written to B. E. Sunny, chairman of the board, indicating a lack of sympathy with the policies of Leonard A. Busby, president of the City Railway properties, in connection with the negotiations to sell the Surface Lines to the city. The board at its annual meeting did not attempt to fill Mr. Insull's place.

Temporary Receivers Appointed.—Hamilton Disston, Jr., and Henry J. Rebman were recently appointed temporary receivers for the Frankford, Tacony & Holmesburg Street Railway, Philadelphia, Pa., by Judge Horace Stern of the Common Pleas Court. The action was taken on motion of Roberts & Montgomery, solicitors for the Tacony Trust Company, trustee. The decree is effective until March 2, at which time there will be a hearing on the question of appointing receivers permanently.

Toronto Railway Liquidating.—The Canadian *Financial Post* says that in order to push ahead the winding up of the Toronto Railway, Toronto, Ont., the liquidator is calling for tenders for the purchase of the remaining properties now in the hands of the company. These have been referred to as the wreckage or debris of the old concern, but there are some really valuable properties, and several of them are expected to add materially to the treasury of the company. The amount shareholders are likely to get over and above the \$110 already distributed will depend in a good measure on the successful sale of the properties still held. It will be recalled that the Toronto Railway is in process of liquidation following purchase of the property some time ago by the city.

Will Issue \$2,116,000 in Bonds.—Stockholders of the Worcester Consolidated Street Railway, Worcester, Mass., have voted to issue, subject to the approval of the Public Utilities Commission of Massachusetts, \$2,116,000 of

first and refunding mortgage bonds due Aug. 1, 1930, which have been held in the treasury of the company unused. The new bonds will bear 6½ per cent coupons. Application has been made to the public utilities department for authority to sell the bonds. The details involving the proposed issue were given in a recent issue of the *ELECTRIC RAILWAY JOURNAL*.

Back Dividends All Paid.—The Louisville Railway, Louisville, Ky., has declared a dividend of 5 per cent on the preferred stock, payable on Feb. 15. The payment of this dividend will clear up all accumulations on the issue.

Another Power Property Purchased.—The Illinois Power & Light Corporation has purchased through the Omaha & Lincoln Railway & Light Company, a subsidiary, all the physical properties and good will of the Ashland Light, Power & Mill Company, Ashland, Neb. The property comprises a hydro-electric plant, a dam and water power rights, a central steam plant and a widespread network of transmission lines. The price paid for the property was not made public. Approximately \$50,000 will be spent immediately on additional transmission lines and revision of the physical property.

December Shows Gain.—In revenue receipts and number of passengers, the Seattle Municipal Railway showed for December, 1924, a gain over a similar period of the previous year. In spite of the heavy expenses due to the snowstorm of the month, the carlines showed a net profit of \$9,686. The revenues in December, 1924, totaled \$552,505 compared with \$524,575 in December, 1923. The number of passengers was 6,693,601 compared with 6,476,848.

Eastern Massachusetts Doing Well.—The Eastern Massachusetts Street Railway, Boston, Mass., reports to the Department of Public Utilities for the quarter ended Dec. 31, 1924, net income after dividends and all charges of \$223,025, against \$3,637 in same period of 1923. Net for the year was \$77,797, against a loss of \$81,318 in 1924.

Want to Sell Property.—Hugh Goodfellow, Warren Olney and W. I. Brobeck, as trustees of the San Francisco-Oakland Terminal Railways and Key System Transit Company, jointly have applied to the California Railroad Commission for permission to sell to the Southern Pacific Company the property formerly belonging to the San Francisco-Oakland Terminal Railways for the sum of \$120,000. This property is the portion of the California Railways lying south of East 14th Street in the city of Oakland, consisting of seven parcels and including all railroad tracks and appurtenances, rights-of-ways and franchises. The Key System Transit Company shall retain possession of trolley equipment and shall have the privilege of operating over the same.

Made Receiver of Long Island Electric.—Gen. Lincoln C. Andrews was appointed receiver of the Long Island Electric Railway, New York, N. Y., by Justice Faber in the Queens Supreme Court on Feb. 6. The application was made by the Long Island Railroad Company.

Personal Items

C. L. Kurtz, Resigned

Following Change in Control, Head of Utility at Columbus, Ohio, Retires—Property Rehabilitated Under His Régime

When Charles L. Kurtz stepped down as president of the Columbus Railway, Power & Light Company, Columbus, Ohio, at the directors' meeting on Jan. 27 he ended a period in his career which will go down in railway history as one of the outstanding examples of generalship in the field of public utilities.

In January, 1919, when Mr. Kurtz assumed that office, the company was without credit, its bond interest was in default, dividends on stock had been suspended, back wages, ordered to be paid the employees during the war, presented another obstacle, and a suit had been instituted by Augusta Slaymaker, a stockholder, for receivership, an accounting and a judgment against the company. In addition pink slips had been issued by the company to passengers who paid a 5-cent cash fare, redeemable for 1½ cents each if the company won the Slaymaker case, which it did.

During the period that the company was under the direction of Mr. Kurtz more than \$13,000,000 was spent for construction and rehabilitation. The daily average of cars in service at the beginning of the 1919-1925 period was 115 to 120. Now it is 320. One and a quarter million dollars was spent in building underground conduits through the center of the city. Within a month a new concrete and steel garage, covering nearly a city block, will be completed to house between 80 and 90 automobiles and trucks. During the latter part of his incumbency Mr. Kurtz and his board of directors closed a deal for a new office building, the first home ever owned by any railway in Columbus since the industry started in 1854. This structure, practically new, 185 ft. deep and 95 ft. wide, is located in the business section of Columbus. Moreover, a new power plant is under construction that will have an ultimate capacity of 150,000 kw.

These are some of the outstanding achievements of the company during the presidency of Mr. Kurtz. All of them were accomplished through his influence, skillfulness, level-headedness, perseverance, and last, but not least, hard work.

The first thing Mr. Kurtz did when he assumed charge in Columbus in 1919 was to institute a program of the most rigid economy. Waste was eliminated. At the same time he worked to build up the morale and restore co-operation as the touchstone of success.

Two years later, through the efforts of Mr. Kurtz, the company received permission from the Ohio Utilities Commission to issue additional A and B preferred stock, enough to equal the amount of dividends accrued on the original amount of A and B stock, thus

wiping out dividends then in arrears by giving stockholders stock equal to the amount of dividend due them. Since then all dividends have been paid regularly.

About this time Mr. Kurtz won his fight before the City Council for an increase in fare. For many years Columbus citizens had been buying eight tickets for 25 cents. The new rate called for five tickets for 25 cents, a 6-cent cash fare, with a universal transfer free of charge. Furthermore, Mr. Kurtz succeeded in placing a \$3,000,000 loan to pay floating debts. This loan has since been wiped out entirely.

It has often been said the quotations for a company's securities are about the best criterion of the general regard in which it is held. A few quotations will show what was done dur-



C. L. Kurtz

ing the 6 years Mr. Kurtz was in office. In 1919 the common stock was quoted at \$8. a share. Today it is \$115 a share. In 1919 A preferred was 42, now about 95. Series B was 23, now 87. In 1919 4 per cent bonds sold from 40 to 42. At the beginning of 1925 they were quoted at 80. Five per cent bonds jumped from 55 in 1919 to 96 in 1925.

The man who did all these things—or was directly or indirectly responsible for their accomplishment—brought to his task with the Columbus company a wealth of business experience. He quit school in the grammar grades, but the grasp that he showed of the problems before him secured for him at the age of 13 a loan of \$5,500 without collateral security. Since then he has been afoot on life's highway. His experiences have indicated to him that there is nothing quite so pleasing as to live under one's own hat. For some years he represented his home of Athens in the General Assembly of Ohio, and was the youngest member, at the age of 25, the age limit for such public office. Then he felt the call of public life and spent about 25 years as chairman of the Republican state executive committee, member of the National

comm'tee, state inspector of oils and private secretary to Governor Foraker, to mention only a few of his activities.

Twenty-seven years ago Mr. Kurtz forsook politics for business. During this period he has been engaged as chief executive of various corporations—the Columbus Public Service Company, a coal company, an asphalt paving company, a paving block company which controlled the output of 15 producing companies, and has latterly been president of the Scioto Stone Company, the Keever Starch Manufacturing Company, the Guanajuato Reduction & Mines Company (a large operation in Mexico which has been producing gold and silver for 20 years).

Mr. Kurtz is at present devoting his time to other projects in which he is interested. He is 70 years old, still very active and energetic and attributes his good health to hard and constant work.

Changes Made in International Personnel at Buffalo

B. J. Yungbluth has been appointed vice-president in charge of operation of the International Railway, Buffalo, succeeding R. Harland Horton, who has gone to Philadelphia. Mr. Yungbluth goes to Buffalo from Philadelphia, where he had been associated with the Philadelphia Rapid Transit Company since 1920. His first connection with the Philadelphia traction system was as a member of the coordinating committee. A year later he was made supervisor of purchasing and supplies. He held this position for 2 years and was promoted to assistant vice-president in charge of finance and accounts. His last position in Philadelphia was assistant vice-president of traffic.

Mr. Yungbluth started his railway career with the Duluth South Shore Railroad, where he rose to the position of storekeeper of the Hancock, Mich., stores. He was connected with that company for 7 years. Later he became storekeeper for the New York Central Lines at Lima, Ohio, and remained there 4 years. In 1909 he became associated with the Pittsburgh Railways as general storekeeper and remained on that property until 1920, when he resigned to accept the position with Mitten Management.

Leslie Spraggon has been appointed superintendent of equipment of the International Railway, to succeed George Kuhn, who has been made superintendent of shops of the company. Mr. Spraggon was at one time inspector of rolling stock with the Connecticut Company. He resigned that position in 1920 to go to the Boston office of the Westinghouse Electric & Manufacturing Company.

G. W. Barker, for more than 25 years associated with the traffic and transportation departments of the International Railway, has been appointed operating manager of the International Bus Corporation, a subsidiary operating the bus lines in Delaware Avenue, Delevan Avenue and Bailey Avenue. Mr. Barker has served as superintendent of the Main Street and Hertel Avenue stations of the International Railway.

Robert Colwell, heretofore superintendent of the Edmonton Radial Railway, Edmonton, Alta., has been appointed manager of the Railway Utility, Winnipeg Electric Company, Suburban Transit Company and Winnipeg, Selkirk & Lake Winnipeg Railway, at Winnipeg, Man. This is a new position created as a result of a reorganization of the operating staffs. Mr. Colwell was born in Simcoe County, Ont., Nov. 5, 1876. He entered transportation service on Jan. 1, 1900, with the Winnipeg Electric Railway.

H. Cowan, heretofore night foreman of the shops of the Niagara, St. Catharines & Toronto Railway at St. Catharines, Ont., has been appointed general foreman of the Canadian National Electric Railways, Toronto Suburban District, shops at Lambton and Weston. He will make his headquarters at the Lambton shops.

Obituary

Robert N. Wallis

Robert N. Wallis, treasurer of the Fitchburg & Leominster Street Railway for a number of years, and prominent in banking, welfare, social and business organizations, died recently at his home in Fitchburg, Mass. Following his graduation from the Massachusetts Institute of Technology, and after a brief period spent in financial journalism in Boston and a year with a business house in Philadelphia, Mr. Wallis returned to Fitchburg to succeed his father as treasurer of the Fitchburg & Leominster Street Railway.

This office was considered a difficult seat in the councils of most any transportation company in those years, but Mr. Wallis's financial ability was soon recognized and his interest extended into the general field of operations. It was said of him that his devotion to the company was no greater during its days of prosperity than it was in its leaner years, and that this devotion was not restricted in the least by his desire that the public should always have the best service which the company could give. He had been trustee of the Worcester North Savings Institution since 1914 and clerk of the corporation since 1899, as well as a director in other trust companies.

Mr. Wallis was president of the American Street and Interurban Railway Accountants' Association in 1908. His activities in behalf of the association were conspicuous.

Although he was overwhelmed with the busy affairs of the railway company, he gave his untiring efforts to the building up of the relief association of the railway. He was its treasurer for many years.

Daniel W. McFetridge, formerly purchasing agent for the Lehigh Valley Transit Company, Allentown, Pa., died at his home in that city on Jan. 31. For the last few years he had been purchasing agent for the Lehigh Portland Cement Company.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Official Tells of Twin City Activity in Car Building

Details of the arrangement under which the Twin City Rapid Transit Company is building cars for other cities were recently made public in a statement issued by Horace Lowry, president of the company.

Mr. Lowry explained that the Twin City lines have very large modern shop facilities which have not been fully utilized in recent years on account of conditions brought about by the war. When the Light-Weight Noiseless Street Car Company received an order to build 50 cars for the Chicago Surface Lines an arrangement was made with the Transit Supply Company, a subsidiary of the Twin City Rapid Transit Company, to have this work done in the Twin City shops, on a cost plus basis.

It was pointed out by Mr. Lowry that the stockholders of the Twin City Rapid Transit Company are protected against loss from this car-building activity and at the same time the Twin City shops are being kept busy. He said that the Transit Supply Company is protected in its arrangement with the Light-Weight Noiseless Street Car Company. Whether or not the car company makes a profit is of no interest to the Transit Supply Company, as the latter is protected and assured a profit by the nature of its contract.

This arrangement was considered highly desirable and profitable by Mr. Lowry. He claimed that the shops and personnel of the Transit Supply Company are inferior to none, and said that the company plans to continue building cars under this arrangement as long as this can be done without interfering with regular street car service in the twin cities. Any profits made from this construction work will go to the operating companies and will thereby be used to reduce the cost of car service.

Resolution Adopted to Investigate General Electric

The United States Senate by vote of fifty-five to twenty-five on February 9 adopted the Norris resolution providing for an investigation of the General Electric Company by the Federal Trade Commission. The majority included virtually all the Democratic Senators and the radical Republicans.

Senator Watson of Indiana, representing, it is believed, the administration viewpoint, attempted to amend the Norris proposal by precluding the investigation of stockholders or other security holders of the company.

That there has been large-scale propaganda in an effort to discredit municipal ownership of public utilities is contended by Senator Norris. It is

believed that many of those who voted for the Norris resolution think it is unnecessary and is an effort to boost public ownership, but at the same time they had no information as to the conduct of the company and did not feel justified in voting against the proposal.

It is expected by certain well-informed observers in Washington, however, that the investigation will prove to be a great disappointment to those who conceived it.

Interborough Rail Order to Bethlehem, Not Krupp

Much attention was attracted by the statement made recently that the Interborough Rapid Transit Company, New York, was negotiating with Krupps in Germany for 6,000 tons of rails. The company did so negotiate, but the order has been placed at home with the Bethlehem Company for the full amount of the tonnage in rails weighing 100 lb. to the yard.

Interest lies in the fact that the order remained at home. It can be said that while American steel rail business has fallen off in neutral markets, and we may expect to see a good deal of generalizing from a few facts as to the trend of things in the international steel trade, thus far it does not appear that foreign steel will figure in any large way in this market. We consumed about 26,000,000 tons of domestic finished steel products last year, and it would take nearly 100,000 tons on top of the total imports of 1924 to bring our consumption of foreign steel up to 1 per cent of the domestic output.

The *Iron Age* said recently that low prices have always been a factor in the shifting of iron and steel trade across national borders, but such low prices have been sporadic and occasional. Proximity, service, quality, mutual interest, and a half dozen other important considerations make it certain that American railroads are likely to rely upon the American manufacturers to meet their demands.

Metal, Coal and Material Prices

Metals—New York		Feb. 10, 1925
Copper, electrolytic, cents per lb.	14.85	
Copper wire base, cents per lb.	17.00	
Lead, cents per lb.	9.70	
Zinc, cents per lb.	7.77	
Tin, Straits, cents per lb.	57.625	
Bituminous Coal f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.	\$4.45	
Somerset mine run, Boston, net tons.	2.125	
Pittsburgh mine run, Pittsburgh, net tons	1.95	
Franklin, Ill., screenings, Chicago, net tons	1.625	
Central, Ill., screenings, Chicago, net tons	1.575	
Kansas screenings, Kansas City, net tons	2.50	
Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	\$7.25	
Weatherproof wire base, N. Y., cents per lb.	20.00	
Cement, Chicago net prices, without bags	2.20	
Linseed oil (5-lb. lots), N. Y., per gal.	\$1.18	
White lead in oil (100-lb. keg), N. Y., cents per lb., earload lots	0.1297	
Turpentine (bbl. lots), N. Y., per gal.	0.945	

Rolling Stock

The British Columbia Electric Railway, Vancouver, B. C., has ordered from the Canadian Car & Foundry Company, Montreal, twelve single-end cars arranged to be operated in trains during peak-load periods on Vancouver city lines. Their general type will be very similar to the trains which have proved successful in Montreal, but the cars will be somewhat larger, and the trailer will have complete four-motor equipment. The car bodies will be of all-steel construction, with girder side frames, similar to the Toronto Transportation Commission's cars. The electrical equipment will be unique, and will, it is said, be the first of its kind to be used in Canada for street car propulsion. The motors will have a rating of 55 hp. at 500 volts, to give ample margin for operation at the high schedule speeds required in Vancouver, over heavy grades. The control system will be multiple-unit, with automatic electrically operated camshaft controller operated by master controller on platform. The camshaft will be motor-driven, giving positive sequence of control steps, with current-limiting relay to give automatic acceleration. The master controller will have only three steps, starting, series and parallel, and in case the current-limiting relay operates too soon to start the car on a grade, the controller may be advanced by an advance lever till the car is in motion, when the automatic feature will come into play again. This control is similar to that installed in the Montreal Harbor Commission's new electric locomotives. The pneumatic door control will be interlocked with the master controller, so as to prevent application of power if all doors are not closed. The cars will be finished outside in enamel, red with cream trim, and the interior trim will be mahogany finished birch. The trailer differs from the motor car in that the length of the front platform is 7 ft. and the seating capacity is 55. The trailer car has no rear platform. The detailed specifications of the motor car follow:

Seating capacity	50
Bolster centers, length.....	25 ft. 0 in.
Length over all.....	48 ft. 8 in.
Truck wheelbase	5 ft. 10 in.
Width over all.....	8 ft. 4 in.
Height, rail to trolley base.....	11 ft. 4 1/2 in.
Headlining	Panelite
Air brakes.....	Westinghouse SMD-D, 10 x 12 in.
Axles.....	A.E.R.A. standard, 4 1/2 in.
Bumpers.....	Rico anti-climbers, 7 in.
Car signal system.....	Faraday
Side bearings.....	Canadian Car & Foundry Company self-oiling roller
Control	Multiple-unit
Couplers.....	Tomlinson, Form 10 electric, with drum cutout switch
Destination signs	Hunter
Door-operating mechanism.....	National Pneumatic
Fenders	HB Hefguards
Headlights	Golden Glow
Journal boxes	3 1/2 x 7 in.
Motors.....	English Electric Company, outside hung, 55 hp.
Seats	Rattan upholstered
Trolley retrievers.....	Earl, 4-A, long drum
Trolley base	U. S. No. 11
Trucks.....	Canadian Car & Foundry Company
Wheels	30 in., rolled steel

Interstate Consolidated Street Railway, Attleboro, Mass., which has just passed to the control of Hemphill & Wells, New York, will be equipped by the new owners with five double-truck

one-man cars and three single-truck one-man cars. Orders for these cars have been placed with the Wason Manufacturing Company at Springfield, Mass. The Interstate was formerly operated with cars that were leased.

Newport Electric Corporation, Newport, R. I., ordered during January of the Fageol Motors Company, Oakland, Cal., four buses of the street-car type.

Seattle Municipal Railway, Seattle, Wash., may possibly be in the market for new buses for equipping feeder lines, if the suggestions recently laid before the City Council are approved.

Macon Railway & Light Company, Macon, Ga., has reconstructed 13 of its cars into one-man cars. The remaining 28 will be converted into the one-man variety as rapidly as possible.

Pacific Northwest Traction Company, Everett, Wash., ordered during January of the Fageol Motors Company, Oakland, Cal., two six-cylinder chassis.

Track and Line

San Francisco, Cal.—The Board of Supervisors approved the measure for the improvement of Judah Street from 31st to 41st Street. Instructions were immediately issued to begin construction of the improvement. When completed, the project will allow the passage of a municipal car line from the ocean to the proposed Mission tunnel when the route for that has been finally decided upon. An appropriation of \$500,000 for the street car line is already available, but has been awaiting the Judah Street improvement.

San Diego Electric Railway, San Diego, Cal., completed recently the Tide Street three-tier grade separation crossing, or Santa Fé overhead crossing, at a cost of \$290,000. It has taken almost 5 months to construct the new viaduct, which is 2,000 feet in length. The object of the improvement was to eliminate the combination hazard that formerly existed at this spot.

Los Angeles Railway, Los Angeles, Cal., is laying new tracks on Fifth Street between Flower and Grand, for which a franchise was recently awarded by the city. Girder rail of 116-lb. weight is being used.

Seattle Municipal Railway, Seattle, Wash., may extend its Montlake and Eastlake Street car systems to the University of Washington, if the agitation started by the people of the district affected results in action. D. W. Henderson, superintendent, was asked to report on the proposition.

Shops and Buildings

Detroit United Railway, Detroit, Mich., suffered damages of \$10,000 recently by a fire at its Ann Arbor carhouse. The office was partially destroyed, but the records were saved.

Long Island Railroad, New York City, N. Y., has the structural steel in place for the new addition to its Morris Park shops. When completed this will provide six overhauling tracks for electric car equipments and complete overhead traveling cranes and material-handling facilities.

Trade Notes

Joseph Dixon Crucible Company, Jersey City, N. J., which manufactures graphite products, pencils, lubricants, crucibles and paint, announces the removal of its Boston office from 49 Federal Street to 80 Federal Street, the new Chamber of Commerce Building.

Differential Steel Car Company, Findlay, Ohio, is acting jointly with the International Steel Tie Company, Cleveland, and is sending H. F. Hastings as a representative through Central and South America and several European countries, particularly Spain, Holland, Belgium and England and later Australia, to visit both the electric traction interests and the steam railroads in these countries. Mr. Hastings, A.M.I.C.E., was formerly representative of a big British manufacturing interest in Spain. He has already covered Cuba, several of the Central American countries and South America and is now en route for Spain.

Illinois Central Railroad has placed an order with the Ohio Brass Company for Tomlinson automatic air and electric couplers to equip 260 cars.

Scott Valve Manufacturing Company, Detroit, Mich., has appointed Russell F. Kleinman, Land Title Building, Philadelphia, as its sales representative. Mr. Kleinman will handle the complete line of Scott bronze and iron body valves in eastern Pennsylvania, southern New Jersey, Maryland, Delaware and the District of Columbia. The Charles H. Tinker Company, 201 Devonshire Street, Boston, Mass., has been appointed the New England representative for the Scott complete line of bronze and iron body valves.

International Oxygen Company, Newark, N. J., re-elected its officers at the annual meeting of the stockholders on Jan. 20. John Heller was added as secretary. The newly elected board declared a dividend of 6 per cent on all the outstanding stock of the company, payable semi-annually.

Blodgett Engineering & Tool Company, Detroit, Mich., has added Roy Gill to its sales organization. Mr. Gill is well known throughout the machine tool field in the United States and will work directly out of the Blodgett factory as a special sales and service representative.

New Advertising Literature

Herman H. Sticht & Company, New York, N. Y., has issued bulletin No. 135, an 8-page pamphlet describing the several models of its Standco "2 in 1" megohmmers. The pamphlet has several illustrations and diagrams.

Georgia Railway & Power Company, Atlanta, Ga., has issued a supplement to its "Snap Shots," dealing with its record of the Ohmer system of fare accounting for December, 1924.

Wagner Electric Corporation, St. Louis, Mo., has issued bulletin No. 141, on Wagner repulsion-induction motors, BA type and bulletin 142 on the Wagner split-phase induction motors, RB type.

Jack Frost doesn't bother Motorman Bill



Notice— Peacock Staffless Brakes

When the wires are frozen stiff and caked with ice, troubles come to those who are not fully prepared. Frequent trolley jumps mean frequent loss of power and the best air brake cannot be expected to function when the power is lost.

Jack Frost has no terrors for "Motorman Bill" because at his right hand a Peacock Staffless stands ready to make the *emergency stop*. Motorman Bill knows he can trust its powerful grip and

the speed with which its full braking is applied.

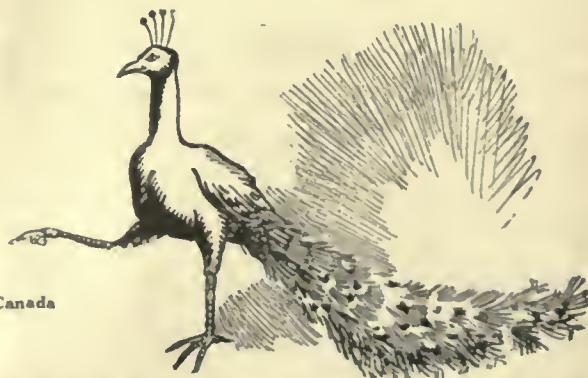
PEACOCK BRAKES are always reliable, always adequate to stop the car if emergency requires. Experienced motormen turn with confidence to their Peacock Brake because they know it is on the job regardless of weather conditions. If you want hand-brake equipment which will do its part year in and year out—demand PEACOCK BRAKES.

Write today for full details

National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Company, Limited, Montreal, Canada



Bankers and Engineers

Ford, Bacon & Davis Incorporated Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation

Engineers—Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES

New York

Boston

Chicago

THE BEELER ORGANIZATION

ENGINEERS AND CONSULTANTS

Traction-Traffic-Equipment-Power

COORDINATION OF SERVICE—IMPROVED OPERATIONS

INCREASED TRAFFIC—FINANCIAL REPORTS

APPRAISALS—MANAGEMENT

52 Vanderbilt Ave.

New York City

SANDERSON & PORTER ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT and POWER PROPERTIES

CHICAGO

NEW YORK

SAN FRANCISCO

ENGELHARDT W. HOLST

Consulting Engineer

Appraisals, Reports, Rates, Service Investigation,
Studies on Financial and Physical Rehabilitation
Reorganization, Operation, Management

683 Atlantic Ave., Boston, Mass.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS • APPRAISALS • RATES • OPERATION • SERVICE

JOE R. ONG

Consulting Transportation Engineer

Specializing in Traffic Problems and in Methods to
Improve Service and Increase
Efficiency of Operation

PIQUA, OHIO

STEVENS & WOOD, INC.

Design and Construction of Power Stations
Railroad Electrification, Industrial Plants

REPORTS AND APPRAISALS

Management and Financing of Utilities and Industrials

Mahoning Bank Bldg.
Youngstown, O.

120 Broadway
New York

Dwight P. Robinson & Company

Incorporated

Design and Construction of

Electric Railways, Shops, Power Stations

125 East 46th Street, New York

Chicago

Los Angeles

Youngstown

Montreal

Atlanta

Philadelphia
Rio de Janeiro

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells

Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management Operation Construction

43 Cedar Street, New York City

DAY & ZIMMERMANN, INC.

ENGINEERS

DESIGN - CONSTRUCTION - REPORTS

VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly Pass—Differential Fares
Ride Selling

143 Crary Ave., Mt. Vernon, N. Y.

J. ROWLAND BIBBINS

Engineer—2301 Connecticut Ave., N.W., Washington, D. C.

TRANSPORTATION SURVEYS

Organized Traffic Relief and Transit Development
Co-ordinating Motor Transport, Railroad and City
Plans, Service, Routing, Valuation, Economic Studies

EXPERIENCE IN 20 CITIES

KELLY, COOKE & COMPANY

Engineers

49 BROADWAY
NEW YORK

424 CHESTNUT STREET
PHILADELPHIA

The Most Successful Men in the Electric Railway

Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week



Quality + Safety = Satisfaction

In developing the safety car the St. Louis Car Co.'s standard of quality has been maintained from the smallest to the largest part going into the car. The results have brought satisfaction to all concerned—the users, the public and ourselves.

The St. Louis Car Company in the future as in the past will look to this three-cornered result—

We make all types—what are your needs?

St. Louis Car Company
St. Louis, Mo.

"The Birthplace of the Safety Car"

The Most Successful Men in the Electric Railway
Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

**Transmission Line and Special Crossing
Structures, Catenary Bridges**

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.

Engineers and Contractors SYRACUSE, N. Y.

THE P. EDWARD WISH SERVICE

50 Church St. NEW YORK Street Railway Inspection DETECTIVES 131 State St. BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

C. R. BUCHANAN
President

W. H. PRICE, JR.
Sec'y-Treas.

JOHN F. LAYNG
Vice-President

BUCHANAN & LAYNG CORPORATION

*Engineering and Management, Construction,
Financial Reports, Traffic Surveys
and Equipment Maintenance*

BALTIMORE
825 Equitable Bldg.

Phone:
Hanover 2142

NEW YORK
49 Wall Street

JAMES E. ALLISON & CO.

Consulting Engineers

Specializing in Utility Rate Cases and
Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.

Bureau of Commercial Economics, Inc.
Industrial Engineers

Organization • Methods • Layout and Facilities
Public and Industrial Relations

72 West Adams Street • CHICAGO

HUMAN ENGINEERING

Railway Audit and Inspection Company, Inc.

Franklin Trust Building, Philadelphia

Boston New Orleans New York Pittsburgh } BRANCHES { Baltimore Chicago Atlanta St. Louis

YELLOW MOTOR COACHES for



Electric Railways operating Yellow Coaches for auxiliary and supplementary service enjoy far more than the advantages of efficient equipment. They have at their disposal the daily experience, methods, and practices of three of America's most successful motor coach operating systems; Fifth Avenue Coach Co., New York; Chicago Motor Coach Co., and the People's Motorbus Co., St. Louis.



These organizations now operate 914 Coaches over 189 miles of streets and boulevards, covering nearly 25,000,000 coach miles annually. Accurate audited records are maintained covering each coach and every mile it runs. The priceless knowledge gained through these records is available to all Electric Railways operating Yellow Motor Coaches.



CHOSEN *by* SCORES of

ELECTRIC RAILWAY SERVICE



Innumerable refinements found exclusively in Yellow Coach design are the result of applying to manufacture, the lessons learned in actual operation.

It is not sufficient that a motor coach merely be strong. Trucks adapted to bus service, fail to satisfy the public demand because the layman recognizes that the design does not meet passenger requirements. An elaborate body, sometimes provided, is not the answer. Even a properly designed chassis alone does not suffice. The two must be co-ordinated properly into a single unit, such as is found in the Yellow Coach.



No other company is more thoroughly equipped to build specialized, revenue-producing vehicles.

YELLOW COACH MANUFACTURING CO.

Austin and Dickens Avenues,
Chicago, Ill.



EXPERIENCED OPERATORS



Pierce-Arrow Motor Coaches bring *new* profits to electric railways

There are territories within your field of operation where the traffic would not warrant the necessarily heavy investment in trackage and other equipment.

Pierce-Arrow Motor Coaches, however, will secure this business for you *at a decidedly good profit*. The investment will be only a fraction of the amount required for electric equipment. Many railways have proved this fact beyond doubt.

The traveling public insists on three main points—speed, comfort and safety. The six-cylinder 100 horsepower engine carries the Pierce-Arrow Motor Coach along at speeds from 45 to 50 miles per hour without any undue tax on the power reserve. The roomy, luxurious, beautifully appointed body is comparable in comfort to a parlor car. The powerful brakes, the low-hung chassis, the solidly built body and the wide tread are all assurances of safety. The coach handles with the ease and flexibility of a high-powered touring car because it is built solely for passenger transportation and is not merely a converted truck.

Our engineers will be glad to demonstrate these modern coaches to railway representatives and to discuss their profit-earning ability.

THE PIERCE-ARROW MOTOR CAR COMPANY
Buffalo, N. Y.

Standard Chassis **\$4600**

Terms if desired

or 196-inch wheelbase, \$4750 for 220-inch wheelbase, at Buffalo; including starter, battery, generator, solid tires and electric lights. Pneumatic tires and disc wheels optional at extra cost. Either chassis will accommodate the Sedan, sight-seeing or pay-enter types of wood or steel bodies, ranging from 18-passenger capacity upward.

**Pierce
Arrow**
SIX-CYLINDER
MOTOR COACHES



Both city
and interurban cars
of the Northern Texas
Traction Company
are MILLERIZED



1924's "star" road points the trend

Practical test in Fort Worth has proved Miller Shoe advantages equally as valuable on city lines as on interurbans.

City service with constant starting and stopping, sharp curves, switches, crossings and intersections needs wire-hugging, smooth-running, 3-in. contact Miller Trolley Shoes. To say nothing of less wire wear, greater mileage, and silent operation—all

cardinal Miller virtues. Backing up problems vanish.

The Northern Texas Traction Company's Collection equipment costs for all cars fell from .751 cents per CM. in 1920 to .642 cents per CM. in 1922 coincident with the installation of Miller Trolley Shoes.

Miller Trolley Shoe Co., Boston-21, Mass.

MILLER TROLLEY SHOES

→ Before you buy **POLES** — See Weyerhaeuser ←

A Pole Selling Policy That May Fit Your *Buying* Needs

WHEN Weyerhaeuser enlarged its pole service it wasn't the intention to scoop up orders as fast as stocks accumulated. That is not the way Weyerhaeuser does business.

The Weyerhaeuser policy has always been to take good care of a group of permanent customers, to ascertain their needs and to meet their requirements as they arise.

Weyerhaeuser men do not claim to make all the good poles. However, this organization does maintain a high standard in the selection of pole timber which results in uniformly good poles. Timber not meeting this standard goes to the saw mill where it is cut into material for which it is suited.

Weyerhaeuser poles formerly sold through jobbers are now being marketed direct to users as announced a short time ago in this publication. A clientele of permanent customers is being built up. Quite a few pole users say our policies and service are just what they have been looking for. Perhaps you will feel as they do. The next time you are in the market for treated or untreated poles or piling give this specialized service a tryout. Prices by mail or wire.

WEYERHAEUSER SALES COMPANY

Distributors of

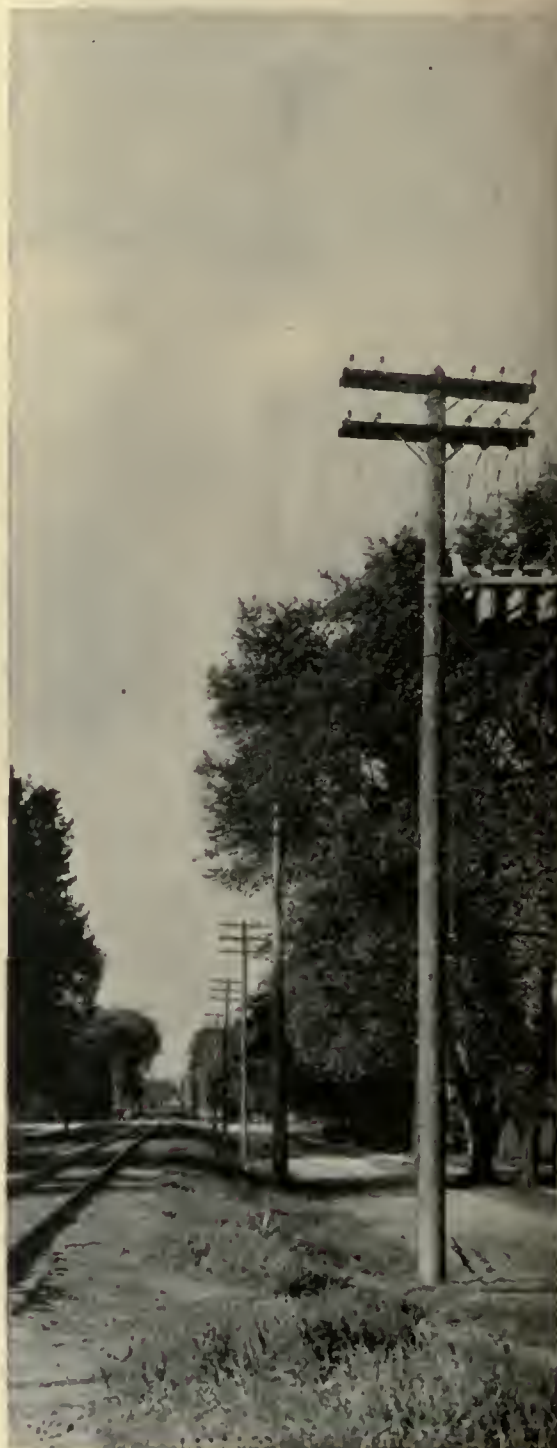
WEYERHAEUSER FOREST PRODUCTS

General Offices: SPOKANE, WASHINGTON

Branch Offices

ST. PAUL CHICAGO BALTIMORE NEW YORK
2694 University Ave. 208 S. La Salle St. 812 Lexington Bldg. 220 Broadway

F. H. Burke, Chicago Office, Manager of Cedar Pole Sales
R. L. Bayne, Spokane Office, Manager of Cedar Pole Service



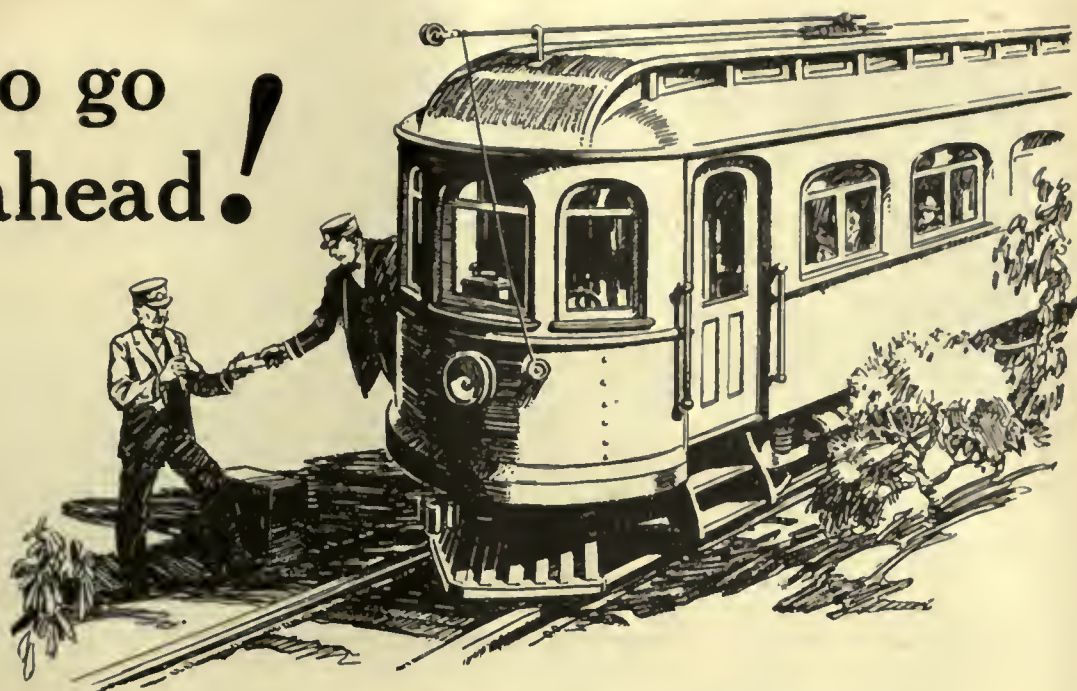
Weyerhaeuser Idaho Red Cedar Poles in the lines of the Beloit Water, Gas and Electric Company, Beloit, Wisconsin



Weyerhaeuser Idaho Red Cedar Poles



Set to go ahead!



Western Electric will help speed the trip

Prosperity signals are again set for the electric railways. In the new construction and equipment planned, electrical supplies will play an important part. That is where Western Electric comes in, with quality products and dependable service.



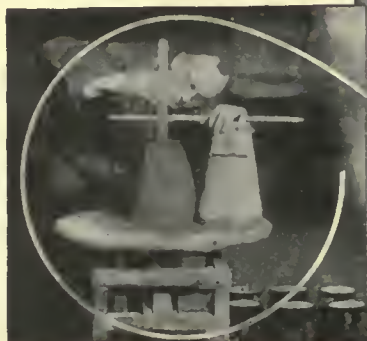
For convenience in buying send for a copy of this 60,000 item catalog. Address our nearest House or 100 East 42nd Street, New York City.

Everything electrical, when and where you want it—that's the Western Electric idea. Everything from a Sunbeam Mazda lamp to a motor installation for your repair shops. Deliveries are prompt coming from our Distributing House near you.

Just say the word when we can be of help.

Western Electric

OFFICES IN 49 PRINCIPAL CITIES



On the job at Newark Bay. By means of this simple slump test, any competent inspector can easily control the quantity of mixing water and, therefore, the strength of the resulting Concrete.



The new, four-track Central Railroad of New Jersey Bridge over Newark Bay will be located 100 feet north of the present structure. The new track level will be 30 feet higher than the old.

New structure is to be 7500 feet long with Concrete Piers weighing 1500 tons each.



Quality Control in the Field

Central Railroad of New Jersey engineers believe in putting the laboratory to work right on the job.

In the Concrete construction, shown above, they are regularly applying approved methods of field control to keep the quality of the Concrete uniform and particularly to maintain desired strength.

Strengths are verified at regular intervals by testing field cylinders.

Proportions of fine and coarse aggregates are accurately determined by fineness modulus.

Slump tests are being made daily to control consistency.

This is only one of many jobs where the most modern field methods of control are directly helping to assure better Concrete with greatest economy.

* * *

The work on the Newark Bay Bridge is being done under the direction of A. E. Owen, Chief Engineer, J. J. Yates, Bridge Engineer, and H. E. Van Ness, Construction Engineer, Central Railroad of New Jersey.

Let us tell you more about the practical advantages of field methods of quality control. Write the nearest office listed below for your free copy of "Concrete Data for Engineers and Architects."

PORTLAND CEMENT ASSOCIATION

A National Organization to Improve and Extend the Uses of Concrete

Atlanta
Birmingham
Boston
Charlotte, N. C.
Chicago
Dallas

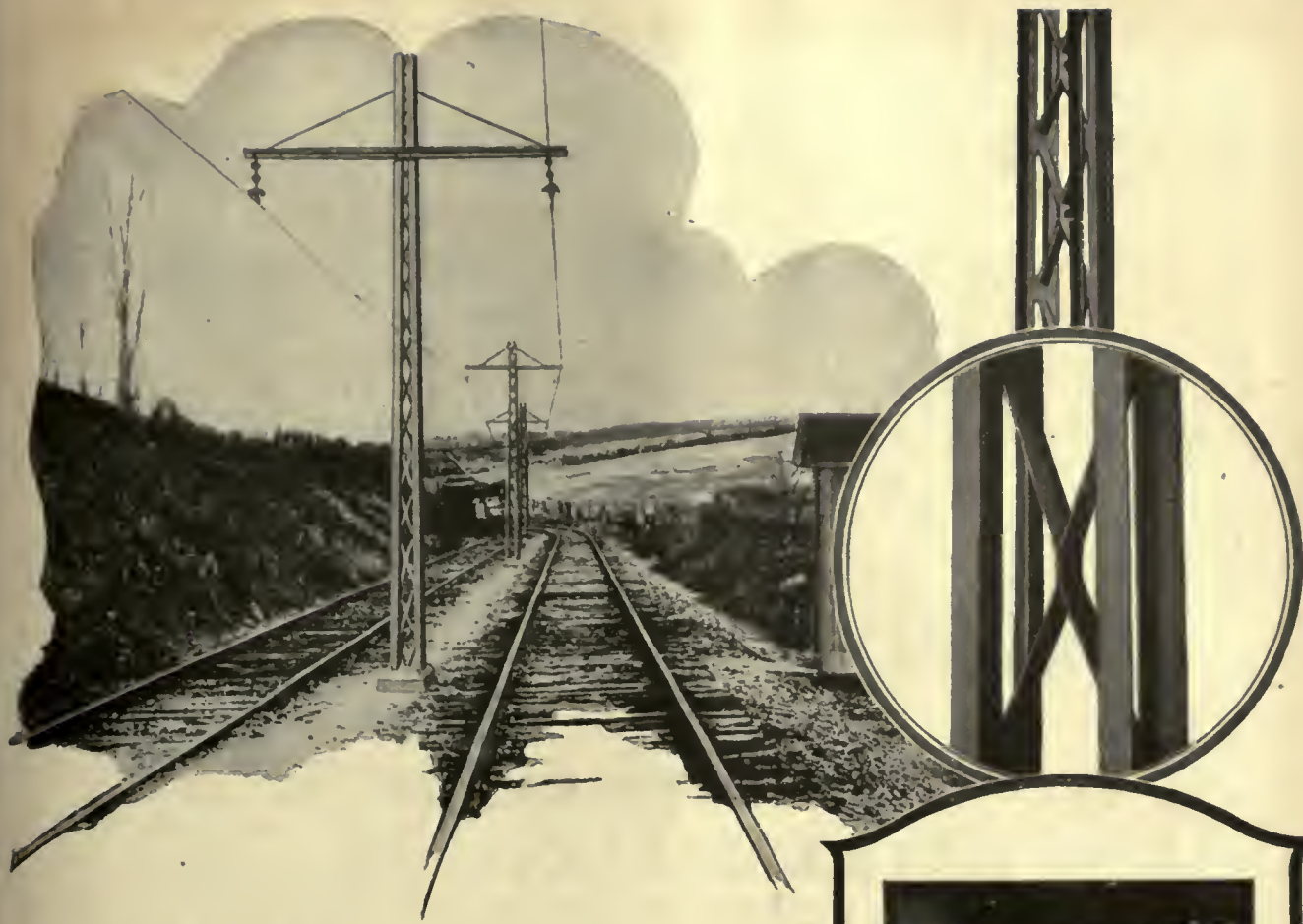
Denver
Des Moines
Detroit

Indianapolis
Jacksonville

Kansas City
Los Angeles
Memphis
Milwaukee
Minneapolis
New Orleans

New York
Oklahoma City
Parkersburg
Philadelphia
Pittsburgh
Portland, Oreg.

Salt Lake City
San Francisco
Seattle
St. Louis
Vancouver, B. C.
Washington, D. C.



Reduces Maintenance Costs

The cost of a trolley or power line is measureable in terms of permanence and maintenance. The nearer your first cost comes to final cost the more economical the line. Truscon Steel Poles, through unusual durability, indestructible character and the economy of less poles per mile, decrease first cost and insure lowest maintenance. Truscon Poles never need reinforcement or replacement. Their copper bearing steel construction combined with truss formation gives them extreme strength and lends permanence to the line. First cost is surprisingly low, maintenance is negligible.

Write today for complete information.

TRUSCON STEEL COMPANY, YOUNGSTOWN, OHIO

Warehouses and Sales Offices from Pacific to Atlantic.

For addresses see phone books of principal cities.

Canada: Walkerville, Ont. Foreign Div.: New York.

TRUSCON

TRUSCON
STEEL CO.

COPPER-BEARING STEEL POLES



INTERIOR of Brooklyn Edison Powerhouse. Truscon Steel Windows installed. These windows conform to every architectural and structural demand for Powerhouses. Truscon Engineers are specialists in daylighting and control of natural ventilation for Powerhouses.

OTHER TRUSCON PRODUCTS

Concrete Reinforcing, Steel Windows and Doors, Standard Buildings, Trusses, Steel Roof Decks, Steel Joists, Hy-Rib and Metal Lath, Highway Products, Platforms and Boxes, Foundry Flasks, Steel Stampings.



Collier Service

A nation-wide
organization
building and
sustaining car
card advertising
space values



Barron G. Collier, Inc.

Candler Bldg.
New York

*Below freezing, but Concrete
unharmmed because made with*

LUMNITE CEMENT

EVEN in coldest weather, concrete made with Atlas Lumnite Cement can be safely poured without the use of artificial accelerators and expensive protective measures.

Lumnite Cement concrete *protects itself against frost*. Not only does it harden in a few hours to a point in its curing beyond danger of freezing—but through the chemical action of this rapid hardening Lumnite produces very considerable heat within its own mass. Lumnite is not “quick setting,” but allows ample time for mixing and pouring.

Atlas Lumnite Cement is a hydraulic building cement that makes concrete stronger in twenty-four hours than the usual twenty-eight-day concrete—through its principal ingredient, Bauxite, a high-grade aluminum ore.

Whenever you must have speed with safety and economy, use Lumnite.

Write for the Atlas Lumnite Cement book containing detailed accounts and photographs of Lumnite's remarkable successes, and the long list of users, including railways, state highway commissions, and electric, telephone, steel and oil companies. All but two of the State Highway Departments east of the Mississippi have already used Lumnite.

THE ATLAS **LUMNITE** CEMENT CO.

25 Broadway, NEW YORK CITY

2000 First Ave., Birmingham, Ala.

134 S. LaSalle St., Chicago



SEND THIS COUPON TODAY

Please send your booklet
on Lumnite, also detailed
information on Lum-
nite's use for _____

E.R.J.F.

Name _____

Address _____

Where **SAFETY** is paramount and **APPEARANCE** *is appreciated*

There You will find

"NATIONAL" Electric Line POLES

generally used in the
built-up districts

because:

being a known quantity in respect to strength and ductility they offer maximum protection both to the company and the public;

because:

they do not detract from the appearance of the finest street; they present a neat appearance and are unobtrusive in the most beautiful surroundings;

because:

they economize space, which is always desirable and often quite necessary;

because:

experience of street railways with their overhead construction points to less interruption, lower up-keep, greater reliability and longer life for these poles.

Bulletin No. 14—"NATIONAL" Tubular Steel Poles—will be sent upon request; ask for it.

NATIONAL TUBE COMPANY

Frick Building, Pittsburgh, Pa.

DISTRICT SALES OFFICES IN THE LARGER CITIES





50 of these cars

Now being constructed for Chicago Surface Lines. Designed for One-man, Two-man or Two-car train units under the design and specifications of the Chicago Surface Lines.



Two-car train unit for Chicago Surface Lines

10 LIGHT WEIGHT NOISELESS CARS

now being constructed for Duluth, Minn., Stillwater, Minn., and Grand Rapids, Mich.

LIGHT WEIGHT NOISELESS ONE-MAN TWO-MAN CAR

22,000 to 24,000 Pounds Complete, Length 36 ft., Seats 43

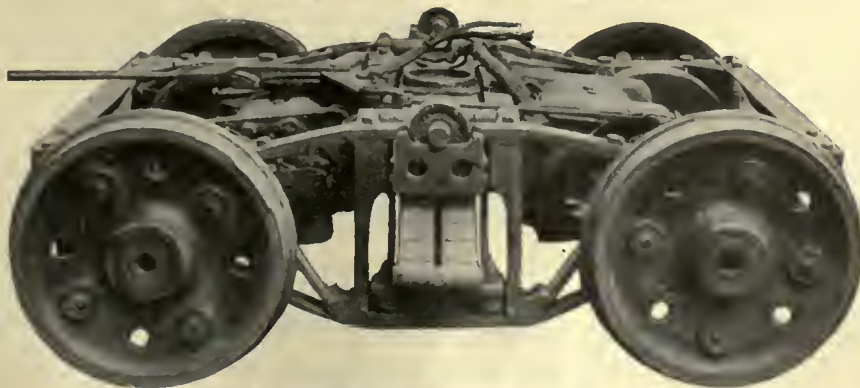
10% faster schedule speed, 40% saving in power compared with standard weight car

Light Weight Car on Smith Light Weight Noiseless Trucks equipped with Hyatt Roller Bearings and Concentric Clasp Axle Drum Brakes provides Faster Acceleration, Faster and More Coasting, Faster and More Comfortable Braking, resulting in Faster Schedules, with greatly reduced Power Consumption and Less Automobile Interference.

ONE-MAN TWO-MAN LIGHT WEIGHT NOISELESS CAR FOR TWO-CAR TRAIN UNIT

26,000 to 28,000 Pounds Complete, Length 46 ft., Seats 48

Send Us Your Specifications for Cars and Trucks



SMITH LIGHT WEIGHT NOISELESS NO. 12 TRUCK
Weight Complete Without Motors 1,000 lbs.

Light Weight Noiseless Electric Street Car Company
1745 Illinois Merchants Bank Building, CHICAGO
Manufacturers of Electric Street Cars
Shops at St. Paul, Minn.



“One-Wear” Mileage Without Maintenance

One unbroken life of service, uninterrupted by visits to the machine shop.

A longer life, without periodical doctoring on the lathe.

Treads and flanges of toughened heat-treated steel that go the limit without re-turning.

These characteristics of Davis “One-Wear” Steel Wheels are causing scores of roads, both steam and electric, to use them. In Davis Wheels, these roads have found more miles per dollar when the final reckoning is made.

American Steel Foundries
NEW YORK CHICAGO ST. LOUIS

DAVIS
“ONE-WEAR”
STEEL WHEELS

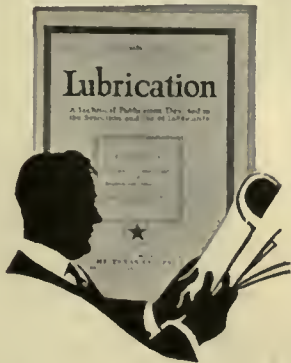
“Just the Idea to Save us Real Money!”

(More than one man in the Electric Street Railway Field
will say that this month.)

More than one man will get a real money-saving idea from The Texas Company's magazine “LUBRICATION,” the latest issue of which is devoted “exclusively to the Electric Street Railway Field.”

The January issue of “LUBRICATION” contains
fresh, original ideas on such subjects as:

1. Methods of Handling and Storing Lubricants in the Electric Street Railway Field.
2. Methods of Reclaiming.
3. Specific Recommendations to eliminate waste and promote efficiency.
4. A comparison of different lubricating methods in the Street Railway Field.
5. The faulty economics of the Guaranteed Contract.
6. The Five Chief Lubricants required by Electric Street Railways.
7. Lubricants to meet special conditions.
8. And other helpful discussion.



THE IDEA IS: Make sure to get your
copy of “LUBRICATION”

Coupon



THE TEXAS COMPANY, U. S. A.
Texaco Petroleum Products
Dept. RJ, 17 Battery Place, New York City



Please send me FREE the issue of your magazine “LUBRICATION” containing the article on “Lubrication in the Street Railway Industry.”

NameCity

StreetState



PRECISION ROLLER BEARINGS

Make Good Railway Motors Better

These heavy-duty bearings—manufactured to unequaled standards of precision—afford, by their design and specially treated materials, the maximum of serviceability under the conditions which electric railway service imposes—conditions involving heavy loads, temporary overloads, shock, jar and vibration. They offer to manufacturers and users of electric railway equipment, new opportunities for reduced maintenance costs and improved service.

Our engineers will welcome an opportunity to work with yours, in applying these high-duty, high-precision bearings to your equipment with a view to realizing in highest degree the advantages and economies which follow the adoption of anti-friction bearings of proved dependability.

**NORMA-HOFFMANN
BEARINGS CORPORATION**
Stamford — Connecticut
PRECISION BALL, ROLLER AND THRUST BEARINGS

**For the
Heavy Loads
and
Hard Service
of Electric
Railway Duty**





Station CCH broadcasting
up-to-the minute Car Heater news

Please stand-by for a message from Station CCH on the latest developments in electric car heating equipment.

What's new in electric car heaters?

IN ADDITION to the popular line of standard cross-seat, truss-plank and panel type heaters, the Consolidated Car Heating Company now offers several novel and effective specialties.

First there is the new and exceptionally light-weight cross-seat heater. It has a flat top, the casing being formed in the approximate shape of a half cylinder. This style heater will occupy the minimum amount of space under seats, and be most inconspicuous. Its casing

is absolutely impregnable from the outside as there is no opening for the accidental or intentional insertion of foreign objects.

Next there is the Electric Blast or Hot Air Heater constituting a combined Heating and Ventilating System in which the incoming air can all be taken from the outside, or partly from the outside, or completely recirculated from the inside of the car. Heat is automatically cut off if the motor stops, and the unit can be used either with or without thermostatic control.



CONSOLIDATED CAR HEATING COMPANY
ALBANY, N. Y.

The *International* Tie of Uniform Quality



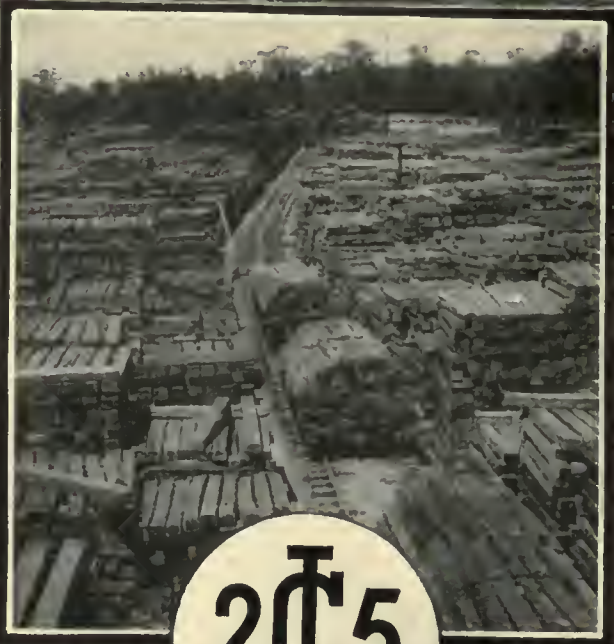
Every *International* Tie is a Standard Specification Tie

THERE is a vast difference between the mere purchase of ties and really investing in Tie Service—when you specify *International* you get both—because every *International* Tie is a sound, well seasoned, thoroughly treated, standard specification tie.

To substantiate our willingness to assume full responsibility for our ties—every *International* Tie is permanently marked with the *International* Dating Nail. This identification is particularly important to the tie consumer because the real value of high grade timber and effective penetration of *International* Treatment can only be realized after many years.

The scientific application of correct principles, together with 30 years of successful experience in the preservation of timber prompts us to trademark our ties permanently. We want you to identify the ties and check for yourself the remarkable service *International* Ties render.

Just specify the timber, the grade and the treatment desired—we will ship the ties exactly as you specify them.



2¢5

*The Stamp of Quality
The International Dating Nail*

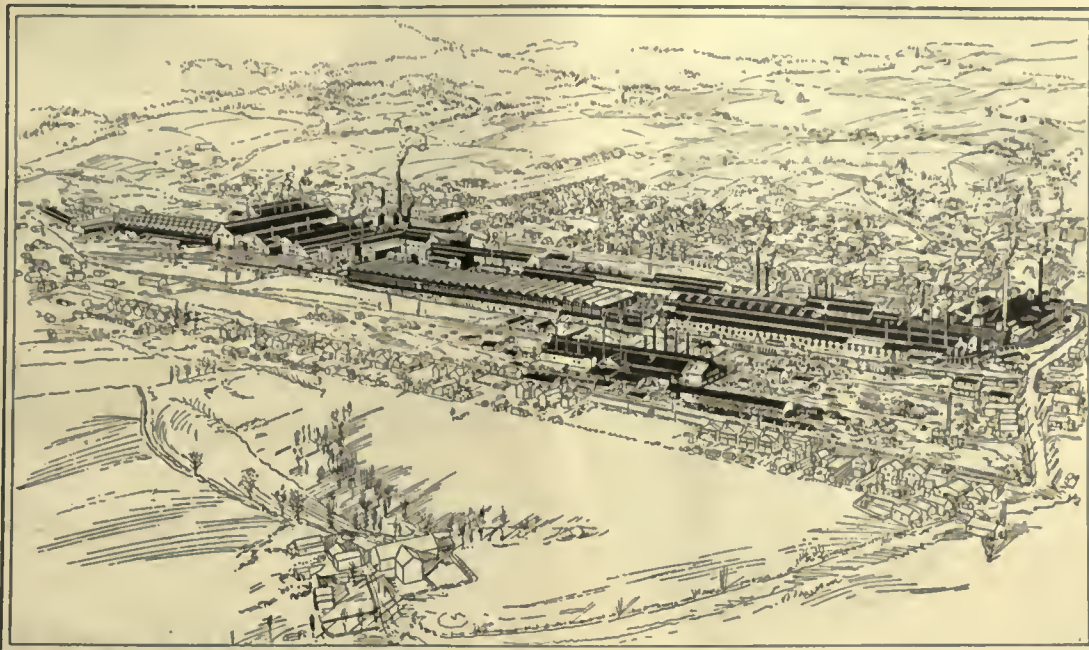
International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas

Beaumont, Texas

Galveston, Texas



STANDARD STEEL WORKS, BURNHAM, PA.



*"Not only to make better products but to make them better understood
—not only to sell but to serve, assisting those who buy to
choose as well as use their purchases—this is the
privilege if not the practice of all modern
manufacturers."— Vauclain.*

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES

CHICAGO
ST. LOUIS
NEW YORK

HOUSTON, TEXAS
PORTLAND, ORE.

RICHMOND, VA.
SAN FRANCISCO

BOSTON
ST. PAUL, MINN.

PITTSBURGH, PA.
LOS ANGELES, CAL.
MEXICO CITY, MEX.

WORKS: BURNHAM, PA.



798
pages,
pocket
size,
flexible,
\$4.00

Information every electric railway man needs—the latest and best methods—changes in practice and theory—that's the New Richey.

On the job—up-to-the-minute—taking advantage of every opportunity to save time, trouble and money—with the New Richey handy at all times—that's your modern railway man.

*Examine the New Richey
for 10 days free. Mail
just the coupon!*

McGraw-Hill FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York, N. Y.

You may send me on 10 days' approval Richey's Electric Railway Handbook, \$4.00 net. I agree to pay for the book or return it postpaid within 10 days of receipt.

Signed

Address

Official Position

Name of Company

(Books sent on approval to retail purchasers in the U. S. and Canada only.) E 2-14-25



Rounded Teeth

Nuttall Gears

EVERY GEAR REGISTERED

*There isn't a bit of noise
in a
Nuttall Gear*

Nuttall Helical Gears are the most silent, easiest-operating, longest wearing and most economical gears made for traction service.

That's the whole story except that more and more of the leading traction companies are making Nuttall Gears standard equipment.

There are Nuttall Gears for every type of traction car, from the one-man safety to the large interurban express.

Examine a set of Nuttall Gears—see how the teeth are cut with rounded edges to facilitate easy installation and to prevent chipping and cutting—note also that there is no undercut at the tooth root where the greatest strength is required—Both of these minor details add materially to the life of the gears. After you see and study these gears in operation you will wonder why you haven't adopted Nuttall Helical Gears long ago.

Get our gear book, it will tell you the whole story.

R.D. NUTTALL COMPANY
PITTSBURGH  PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

THE Metal and Thermit Corporation, New York, N. Y., has questioned the accuracy of the following statement which appeared in the advertisement of the Alumino-Thermic Corporation, Roselle Park, N. J. in the September 27, 1924 issue of ELECTRIC RAILWAY JOURNAL:

"Do you realize that over half the alumino-thermic welds installed on American roads this year, have been made by the FERALITE PROCESS?"

THE Metal and Thermit Corporation offered to submit its records of sales and deliveries to an audit by a public accountant to be selected by the management of ELECTRIC RAILWAY JOURNAL,

provided that the Alumino-Thermic Corporation would do the same. The results were to be held in strict confidence by the management of ELECTRIC RAILWAY JOURNAL and used only to determine the veracity of the statement in question. The Metal and Thermit Corporation has given access to its records to Ernst and Ernst, the auditor selected. The Alumino-Thermic Corporation has been unwilling to submit to such an audit.

ELECTRIC RAILWAY JOURNAL, in accordance with its policy of fairness to both its readers and its advertisers, chooses this manner of disowning any responsibility for the statement as it appeared.

ELECTRIC RAILWAY JOURNAL
NEW YORK, N. Y.

Approaching the Ideal in Track Construction

Concrete for the track foundation!

Dayton Resilient Ties embedded in it!

That's approaching the ideal in track construction!

The maximum service from the concrete is secured by the shock absorbing feature of this tie. The shocks of traffic are not permitted to reach the concrete and disintegrate it. Neither is the strength of the concrete paving over the tie weakened by undue displacement as with the wood tie. Uniform thickness is maintained.

The Dayton
Mechanical Tie Co.
707 Commercial Building
DAYTON, OHIO



DAYTON *Resilient* TIE

Ebony Asbestos Wood



*Installation
by the Bureau
of Power and
Light, Los Angeles,
Calif.*

THE greatest possible electrical and mechanical safety goes with the attractive appearance of this Ebony Asbestos Wood combined Switch and Bench board, of the Bureau of Power and Light, Los Angeles, California. Ebony Asbestos Wood surpasses all other switchboard materials in dielectric strength and resistance to shock. It is easy to cut and drill.

JOHNS-MANVILLE, Inc., 292 Madison Ave., N.Y.C.
Branches in 62 Large Cities
For Canada: Canadian Johns-Manville Co., Ltd., Toronto



JOHNS- MANVILLE



Kharab

Among certain Persian tribes, kharab is the way the man gets treated by his bevy of wives when he gets careless with his affections.

They simply string him up by the heels and the resulting din sounds like the slapping of misapplied carbon brushes on a pitted commutator—

—proving that there's always a punishment for the man who flirts with strange females or strange brushes.

Let a man who has been using Morganite try some of those flossy brushes—

—and he'll have all the excitement he wants and he'll pay dearly for it if he doesn't get back to Morganite quickly.

This isn't TELLING you anything—it's simply REMINDING you.

Morganite Brush Co., Inc.

Main Office and Factory:
519 West 38th St., New York

DISTRICT ENGINEERS AND AGENTS

Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn Ave.
Cincinnati, Electrical Engineering & Mfg. Co., 607 Mercantile Library Building.
Cleveland Electrical Engineering & Mfg. Co., 422 Union Building.
Philadelphia, Electric Power Equipment Corp., 412 North 18th St.
Baltimore, O. T. Hall, Sales Engineer, 1926 Edmondson Ave.
Revere, Mass., J. F. Drummey, 75 Pleasant Street.
Los Angeles, Special Service Sales Co., 502 Delta Building.
San Francisco, Special Service Sales Co., 202 Russ Building.
Toronto, Can., Railway & Power Engineering Corp., Ltd., 101 Eastern Ave.
Montreal, Can., Railway & Power Engineering Corp., Ltd., 326 Craig St., West.
Winnipeg, Can., Railway & Power Engineering Corp., Ltd., P. O. Box 325.

Your Passengers Will Enjoy Their Ride On Hale-Kilburn Seats

Especially Designed for
One Man Safety Cars

**Lightest
Strongest
Simplest
Neatest**



*Lightest
Weight
Stationary
Steel Seat*



*Lightest
Weight
Walkover
Steel Seat*

*No higher in price than others
Write for particulars*

Hale-Kilburn Company
PHILADELPHIA

New York
30 Church St.

Chicago
McCormick Bldg.

Richmond
Mutual Bldg.

Atlanta
Candler Bldg.

San Francisco
903 Monadnock Bldg.

Los Angeles
320 S. Pedro St.

IRVING SAFKAR STEP

TRADE MARK

DAMAGES paid for one car step accident may cost you more than a complete equipment of permanently non-slipping "SAFKAR" Car Steps for every car on your system. They're lighter in weight than other steps, too — a big saving in dead load. And maintenance costs upon them are negligible.

Write for Catalog 4A28.

IRVING IRON WORKS CO.
LONG ISLAND CITY, N.Y. U.S.A.



Reg. U. S. Pat. Office

Incandescent Lamp Cord

AMELECTRIC PRODUCTS**BARE COPPER WIRE AND CABLE****TROLLEY WIRE****WEATHERPROOF WIRE
AND CABLE****PAPER INSULATED
UNDERGROUND CABLE****MAGNET WIRE****AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.**Boston, 174 Federal; Chicago, 113 W. Adams;
Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.**ELRECO TUBULAR POLES****COMBINE****Lowest Cost
Least Maintenance****Lightest Weight
Greatest Adaptability**

Catalog complete with engineering data sent on request.

**ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO**

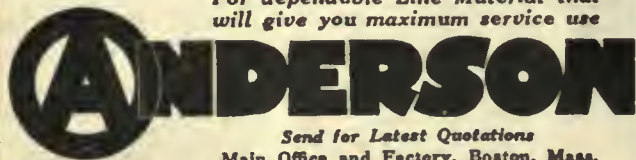
New York City, 30 Church Street

THE WORLD'S STANDARD**"IRVINGTON"****Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper****Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds****Irvington Varnish & Insulator Co.
Irvington, N. J.***Sales Representatives in the Principal Cities***We are prepared****to handle any high grade proposition where
VARNISHED CAMBRIC
Wires and Cables
are required.**When using *quality* Wires and Cables use *quality* Tapes.
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes.**THE OKONITE CO., Passaic, N. J.
Incorporated 1884****SALES OFFICES:** New York, Chicago,
Pittsburgh, St. Louis, Atlanta, Birmingham, San Francisco

F. D. Lawrence Electric Co., Cincinnati, O.; Novelty Electric Co., Philadelphia, Pa.; Pettingill-Andrews Co., Boston, Mass.

Canadian Representatives: Engineering Materials Limited, Montreal.

TRADE

*For dependable Line Material that
will give you maximum service use*

MARK

*Send for Latest Quotations
Main Office and Factory, Boston, Mass.***Chapman
Automatic Signals****Charles N. Wood Co., Boston****Shaw Lightning Arresters***Standard in the Electric Industries
for 35 years***Henry M. Shaw****150 Coit St., Irvington, Newark, N. J.****ROEBLING****WELDING CABLE****ELECTRICAL WIRES and CABLES****John A. Roebling's Sons Company, Trenton, N. J.****Standard Underground Cable Co.****BOSTON PHILADELPHIA PITTSBURGH DETROIT
NEW YORK WASHINGTON CHICAGO ST. LOUIS SAN FRANCISCO****AUTOMATIC SIGNALS****Highway Crossing Bells
Headway Recorders
Flasher Relays****NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.****PEIRCE
Railway Feeder Pins***A strong Forged Steel Pin designed for heavy duty.
Their low cost permits their use over the entire
system.***HUBBARD & COMPANY****PITTSBURGH****CHICAGO****ANACONDA
TROLLEY WIRE****ANACONDA COPPER
MINING COMPANY**

Cooney Building, Chicago, Ill.

**THE AMERICAN
BRASS COMPANY**

General Offices: Waterbury, Conn.

BUDA

ESTABLISHED
1881

Special Track Work of every
description

THE BUDA COMPANY
Harvey (Suburb
Chicago) Illinois

SPECIALISTS

in the

Design and Manufacture
of

*Standard—Insulated—and
Compromise Rail Joints*

The Rail Joint Company
61 Broadway, New York City

Arc Weld Rail Bonds

AND ALL OTHER TYPES

Descriptive Catalogue Furnished

American Steel & Wire Company

Chicago
New York
Boston
Cleveland
Pittsburgh
Denver

U. S. Steel Products Co.
San Francisco

Los Angeles

Portland

Seattle



*Cambria Rolled Steel
Electric Car Wheels*

Best for Longer Service

Other products for the electrical field includes axles, armature shafts, rails, spikes, track work, splice bars, bolts, tie plates, tie rods, pole line material, sheets, magnet steel and gear blanks.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

BETHLEHEM

'CARNEGIE'
for
**WHEELS
AXLES
RAILS
CROSS TIES**



Carnegie Steel Company
PITTSBURGH, PENNA.

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS

IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE
CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa.

Sales Offices:

Atlanta

Chicago
Philadelphia

Cleveland

Pittsburgh

New York

Pacific Coast Representatives:

United States Steel Products Company

Los Angeles

Portland

San Francisco

Seattle

Export Representatives:

United States Steel Products Company, New York, N. Y.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of
Water Tube Boilers
of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building



WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguilar 104
SAN JUAN, PORTO RICO, Royal Bank Building

GODWIN Steel Paving Guards

*Adapted to all
types of rails
and paving*



Proven by service
to economically
prevent seepage
and disintegration
of street railway
paving.

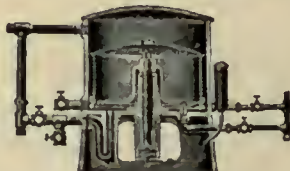
Write for Illustrated Catalog No. 20.

W. S. GODWIN CO., Inc.
RACE & McCOMAS STS., BALTIMORE, MD.

Turbine driven Reclaiming Machine

saves

Oil and Wiping Waste



The Oil & Waste Saving Machine Co.

1509 Real Estate Trust Bldg., Philadelphia, Pa.
Dept. D.

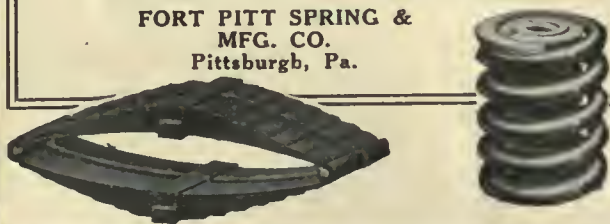
Play for safety—

*plus resiliency—
plus long life*

By specifying

FORT PITT SPRINGS

FORT PITT SPRING &
MFG. CO.
Pittsburgh, Pa.



U. S. ELECTRIC AUTOMATIC SIGNAL

for single track block signal protection

United States Electric Signal Co.

West Newton, Mass.

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines,
Condensers, Gas and Oil Engines, Air Compressors,
Air Brakes

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut



ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed.
Up-to-date and economical.

Alumino-Thermic Corp., Roselle Park, N. J.

ECONOMIZERS

reduce fuel costs by making
use of waste exhaust gases
to preheat the boiler feed.
Patented construction proven
in 30 years of service.

FOSTER

SUPERHEATERS

improve engine, turbine and
boiler economy by enabling a
given amount of steam to do
more work. Over 10,000 in-
stallations in stationary power
plants.

POWER SPECIALTY CO., Boston, Phila., Pitts., Detroit, Kans. City, Chicago,
San Fran., Los Angeles, Boulder, Dallas, London 111 Broadway, NEW YORK

R. A. HEGEMAN, Jr., President
H. A. HEGEMAN, Vice-Pres. and Treas.
W. C. PETERS, Manager Sales and Engineering

C. C. CASTLE, First Vice-President
F. T. SARGENT, Secretary

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and
Change Maker
The Aluminum Field Colls
Walter Tractor Snow Plows
Cutter-Hammer Electric
Heaters
Pittsburgh Forge & Iron
Co.'s Products
Genesco Paint Oils
E. Z. Car Control Corpora-
tion's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s
Single and Double Deck
Buses

Economy Electric Devices
Co.'s Power Saving and
Inspection Meters
Anglo-American Varnish Co.,
Varnishes, Enamels, etc.
Gilmer Multiple Safety Stee
Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co.,
Springs
Turnstile Car Corporation's
Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device



The Zone System of Fares
is Successfully Collected
with the Aid of

CLEVELAND FARE BOXES

Let Us Give You Particulars

The Cleveland Fare Box Co.
Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd.,
Preston, Ont.

Coin Counting and Sorting Machines. Change Carriers



N-L Type "C" Arch Roof Ventilator

Stuffy Cars Empty Fare Boxes

Many people simply will not ride in poorly ventilated cars. Why not encourage them to ride by making the cars comfortable? N-L Ventilators make it possible to keep them amply warm yet perfectly ventilated. They change all the air in the car many times an hour. They are weatherproof, dustproof, draftproof, silent—and good looking.

Ask for a copy of "Superior Ventilation."
It explains all.

The Nichols-Lintern Co.

7960 Lorain Ave., Cleveland, Ohio

Canadian Representative:

Railway & Power Eng. Corp., Ltd., Toronto, Ontario



SEVEN WORKS
RAMAPO-AJAX-ELKOT

Ramapo Ajax Corporation

HILLBURN NEW YORK
NIAGARA FALLS, N.Y.
CHICAGO, ILLINOIS
EAST ST. LOUIS, ILL.
PUEBLO, COLORADO
SENIORVILLE, OHIO
NIAGARA FALLS, ONT.
CANADA



RAMAPO AUTOMATIC
RETURN SWITCH STANDS
FOR PASSING SIDINGS
TEE RAIL SPECIAL WORK
MANGANESE CONSTRUCTION
SALES OFFICES AT ALL WORKS
Main Office, HILLBURN, N.Y.

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings
Bemis Pins are absolutely smooth and true to diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.



Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

RAILWAY UTILITY COMPANY

CAR COMFORT WITH
UTILITY

HEATERS
REGULATORS
VENTILATORS

141-151 West 22d St.
Chicago, Ill.

Write for
Catalogue

1328 Broadway
New York, N. Y.

PROVIDENCE H-B FENDERS LIFE GUARDS

The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

100 New Users in the Last Nine Months KASS SAFETY TREADS

HIGH

in efficiency and lasting qualities

LOW

in weight, initial and upkeep costs

Morton Manufacturing Co., Chicago

HORNE & EBLING CORPORATION

50 CHURCH ST.,

NEW YORK, N. Y.

Brass Hardware
For Cars and Buses

Motor and Controller
Parts



Sterling Trolley Bases
and Brakes

Mall. Iron and Brass
Castings

NEW and RELAYING RAILS

1 TON or 1000

TRACK
EQUIP-
MENT

L.B. FOSTER CO.

PITTSBURGH - PENNSYLVANIA

RAIL
ACCESS-
ORIES

NEW YORK - JERSEY CITY - PHILADELPHIA - HAMILTON, O.

Griffin Wheel Company

410 North Michigan Ave.
Chicago, Ill.

GRIFFIN F. C. S. WHEELS

For Street and Interurban
Railways

FOUNDRIES:

Chicago
Detroit
Denver

Boston
Kansas City
Council Bluffs

St. Paul
Los Angeles
Tacoma



THE RUSH HOUR

holds no terrors for you or your passengers if your rolling stock keeps rolling...

AJAX BULL BEARING ALLOY

will keep bearings and passengers cool.
Stays on the job for a long time.



The Ajax Metal Company

ESTABLISHED 1880

PHILADELPHIA

New York

Chicago

Boston

Cleveland



Type R-11
Double Register

International Registers

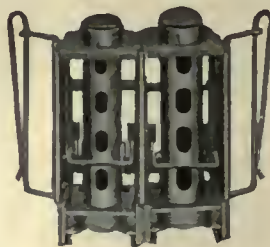
Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for
HEEREN ENAMEL BADGES.

The International Register Co.

15 South Throop Street, Chicago, Illinois

JOHNSON Universal Changer



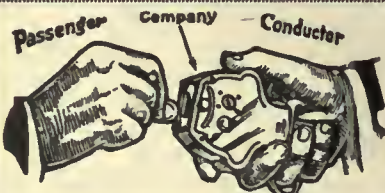
Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenwood, Chicago, Ill.



Direct Automatic Registration By the Passengers

Rooke Automatic
Register Co.
Providence, R. I.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws.

Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No.
478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.



Gets Every Fare PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc.
101 Park Avenue, New York City

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance

Positions Vacant and all other classifications, 5 cents a word, minimum charge \$2.00.

Proposals, 40 cents a line an insertion.

INFORMATION

Max Number in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals)

DISPLAYED—RATE PER INCH

1 to 3 inches . . . \$1.50 an inch
4 to 7 inches . . . 4.38 an inch
8 to 14 inches . . . 4.10 an inch
Rates for larger spaces, or best rates, on rental in advertising such as measured vertically on one column, 3 columns—20 inches—to a page

E. F. J.

POSITIONS VACANT

ELECTRICAL engineer with good technical training and about eight years' experience in electric light, power and railway public utility work. Location, large city in Brazil. In applying please give full particulars regarding self and experience, stating also salary desired and when available. P-778, Electric Railway Journal, 10th Ave. at 36th St., New York.

EXPERIENCED man wanted to take charge of our car shops and equipment, which consists of 12 passenger motor cars, 2 motor express cars, one snow plow and 6 passenger trailers; will require a man capable and willing to do armature winding, field repairing, etc.; one who is thoroughly familiar with general repairs to interurban cars and general car shop work; give all reference, salary required and when services can be had in first letter; position located in Northwest. P-781, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SPECIAL track work draftsmen wanted, preference given men having had experience with special track work manufacturer, but will consider one or two junior draftsmen familiar with trigonometry. State age, experience and salary in first letter. P-774, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

ACCOUNTING executive, railway, electric and gas utilities, now employed, seeks change; can produce results. PW-780, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

KERN, energetic operating official with successful record and excellent references, now employed, for personal reasons desires change; has had over 20 years' practical experience in steam city, and interurban operation, filling all the positions in the successive steps from platform to general superintendent; correspondence invited. PW-783, Electric Railway Journal, 10th Ave. at 36th St., New York.

MASTER mechanic having had twenty years' practical experience on small road in New England desires similar position. Unquestionable references and ability assured. PW-776, Electric Railway Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT or chief of secret service department, now employed, desires change; thoroughly experienced in all branches; can produce results; best of references. PW-782, Electric Railway Journal, 10th Ave. at 36th St., New York.

SALESMAN WANTED

Side Line
Salesman who is already calling on, or in touch with street railways in the eastern part of the United States to take on a new article for sale, paying a good commission for which there is a great demand, and very little competition. SW-784, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

POSITION WANTED Claims Executive

Competent, experienced, at present with one of the largest properties in the country, desires new connection.

PW-785, Electric Railway Journal
10th Ave. at 36th St., New York City

WANTED

USED PORTABLE SUB-STATION

Will buy or rent one used portable substation, 500 to 1000 kw.-600-v.D.C. output, complete with control equipment, car and accessories. Rotary converter preferred. Also transformers for use with above, to be used with 4000 or 23000-60-cy. primaries.

Bidders to submit proposal to

L. R. WAGNER, E.E.
Department of Street Railways, St. Jean
and Shoemaker Aves., Detroit, Michigan

WANTED

32 G. E. 1000

MOTORS

TRANSIT EQUIPMENT COMPANY
Cars—Motors
501 Fifth Ave., New York

FOR SALE

20—Birney Safety Cars. Brill built. Seating 32.

8—Steel Interurbans, 48 ft. long. Seating 52.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

Relaying Rails NEW RAILS—ACCESSORIES

Buy Guaranteed
Relaying Rails
and Save 30%
to 50%

1 Ton or 1000

LBFOSTERCO

PITTSBURGH PA. NEW YORK CITY
JERSEY CITY PHILADELPHIA HAMILTON O.

WANTED

Orders for Oak, Car Stock, Cross Ties, Switch Ties, Timber

Have four mills in operation. A good stand of timber. Grades guaranteed. Prices right. Let's get equaluated.

ENARC LUMBER MFG. CO.
411 A. O. U. W. Bldg., Little Rock, Ark.

CAR WHEEL BORER

For Immediate Delivery

1—48-in. Niles Car Wheel Boring Machine without derrick, otherwise complete; good condition.

POWER SUPPLY COMPANY
Terre Haute, Indiana

SOME ONE WANTS TO BUY

the equipment or machinery that you are not using.

This may be occupying valuable space, collecting dust, rust and hard knocks, in your shops and yards.

SELL IT BEFORE DEPRECIATION SCRAPS IT

THE SEARCHLIGHT SECTION
IS HELPING OTHERS

—LET IT HELP YOU ALSO

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

- Advertising, Street Car**
Collier, Inc., Barron G.
- Anchor, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.
- Armature Shop Tools**
Elec. Service Supplies Co.
- Automatic Return Switch**
Stands
Ramapo Ajax Corp.
- Automatic Safety Switch**
Stands
Ramapo Ajax Corp.
- Axles**
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
St. Louis Car Co.
Standard Steel Wks.
Westinghouse E. & M. Co.
- Babbitt Metal**
Ajax Metal Co.
- Badges and Buttons**
Elec. Service Supplies Co.
International Register Co., The
- Bearings and Bearing Metals**
Ajax Metal Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
More-Jones Brass & Metal Co.
Westinghouse E. & M. Co.
- Bearings, Center and Roller**
Side
Stucki Co., A.
- Bells and Gongs**
Brill Co., The J. G.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
- Bearings, Roller**
Norma-Hoffman Bearings Corp.
- Bells & Gongs**
Western Electric Co.
- Bollers**
Babcock & Wilcox Co.
- Boiler Tubes**
National Tube Co.
- Bonding Apparatus**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Western Electric Co.
- Bonds, Rail**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.
- Book Publishers**
McGraw-Hill Book Co.
- Brackets and Cross Arms**
(See also Poles, Ties, Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Western Electric Co.
- Brake Adjusters**
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
- Brake Shoes**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
- Brakes, Brake Systems and Brake Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
Johns-Manville Inc.
National Brake Co.
Westinghouse Tr. Br. Co.
- Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co., Inc.
Westinghouse E. & M. Co.
- Brushes, Graphite**
Morganite Brush Co., Inc.
- Buses, Motor**
Brill Co., The J. G.
Garford Motor Truck Co.
International Motor Co.
N. Y. Transportation Co.
Pierre Arrow Motor Car Co.
St. Louis Car Co.
Yellow Coach Mfg. Co.
- Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.
- Cables, (See Wires and Cables)**
- Cambric Tapes, Yellow and Black Varnish**
Irvington Varnish & Ins. Co.
- Carbon Brushes (See Brushes, Carbon)**
- Cars, Dump**
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.
- Car Lighting Fixtures**
Elec. Service Supplies Co.
- Car Panel Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.
- Car Steps, Safety**
Irving Iron Wks.
- Cars, Passenger, Freight, Express, etc.**
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
- Cars, Gas, Rail**
Brill Co., J. G., The
St. Louis Car Co.
- Cars, Second Hand**
Electric Equipment Co.
Transit Equipment Co.
- Cars, Self-Propelled**
Brill Co., J. G., The
General Electric Co.
- Castings, Brass, Composition or Copper**
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.
- Castings, Gray Iron and Steel**
American Steel Foundries
Bemis Car Truck Co.
Standard Steel Works
- Castings, Malleable and Brass**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Horne & Ebling Corp.
- Catchers and Retrievers, Trolley**
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
- Category Construction**
Archbold-Brady Co.
Western Electric Co.
- Ceilings, Plywood, Panels**
Haskelite Mfg. Co.
- Cement Products**
Atlas Lumnite Co.
Portland Cement Asso.
- Change Carriers**
Cleveland Fare Box Co.
- Circuit-Breakers**
Anderson, A. & J. M. Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Clamps and Connectors for Wires and Cables**
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)**
Brill Co., The J. G.
- Clusters and Sockets**
General Electric Co.
- Coal and Ash Handling (See Conveying and Hoisting Machinery)**
- Coll Raulding and Winding Machines**
Elec. Service Supplies Co.
- Colls, Armature and Field**
Economy Elec. Devices Co.
General Electric Co.
Westinghouse E. & M. Co.
- Colls, Choke and Kicking**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Coin Counting Machines**
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.
- Coin Sorting Machines**
Cleveland Fare Box Co.
- Coin Wrappers**
Cleveland Fare Box Co.
- Commutator Slotters**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Commutator Truing Devices**
General Electric Co.
- Commutators or Parts**
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Compounds (Insulating & Splicing)**
Johns-Manville, Inc.
- Compressors, Air**
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Tr. Br. Co.
- Concrete Flooring Surface**
Irving Iron Wks.
- Condenser Papers**
Irvington Varnish & Ins. Co.
- Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Connectors, Soldeless**
Westinghouse E. & M. Co.
- Connectors, Trailer Car**
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.
- Controllers or Parts**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Controller Regulators**
Elec. Service Supplies Co.
- Controlling Systems**
General Electric Co.
Westinghouse E. & M. Co.
- Converters, Rotary**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Copper Wire**
Anaconda Copper Mining Co.
- Cord, Bell, Trolley, Register**
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebbling's Sons Co., John A.
Samson Cordage Works
Silver Lake Co.
- Cord Connectors and Couplers**
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
- Couplers, Car**
American Steel Foundries
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Cross Arms (See Brackets)**
- Crossing Foundations**
International Steel Tie Co.
- Crossing, Frog & Switch**
Ramapo Ajax Corp.
- Crossing, Manganese**
Ramapo Ajax Corp.
- Crossings**
Ramapo Ajax Corp.
- Crossing, Track (See Track, Special Work)**
- Crossings, Trolley**
Ohio Brass Co.
- Curtains & Curtains Fixtures**
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
- Dealer's Machinery**
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.
- Derailing Devices (See also Track Work)**
- Derailing Switches**
Ramapo Ajax Corp.
- Destination Signs**
Elec. Service Supplies Co.
- Detective Service**
Wish-Service, P. Edward
- Door Operating Devices**
Brill Co., The J. G.
Consolidated Car Heat Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
St. Louis Car Co.
- Doors & Door Fixtures**
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Morton Mfg. Co.
St. Louis Car Co.
- Doors, Folding Vestibule**
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
- Drills, Track**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
- Dryers, Sand**
Elec. Service Supplies Co.
- Ears**
Ohio Brass Co.
- Ebony Asbestos Wood**
Johns-Manville, Inc.
- Economizers**
Power Specialty Co.
- Electrical Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebbling's Sons & Co., J. A.
- Electrical Wires & Cables**
Western Electric Co.
- Electric Grinders**
Western Electric Co.
- Engineers, Consulting, Contracting and Operating**
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layng Corp.
Bureau of Commercial Economics, Inc.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.
- Engines, Gas, Oil or Steam**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.
- Fare Boxes**
Cleveland Fare Box Co.
Economy Elec. Devices Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.
- Fare Registers**
Ohmer Fare Register Co.
- Fences, Woven Wire and Fence Posts**
Amer. Steel & Wire Co.
- Fenders and Wheel Guards**
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
- Fibre and Fibre Taping**
Johns-Manville, Inc.
Westinghouse E. & M. Co.
- Field Coils (See Coils)**
- Fire Extinguishers**
Johns-Manville, Inc.
- Flangeway Guards, Steel**
W. S. Godwin Co., Inc.
- Floodlights**
Elec. Service Supplies Co.
- Flooring Composition**
Johns-Manville, Inc.
- Flooring, Fireproof**
Irving Iron Wks.
- Flooring, Non-Slipping**
Irving Iron Wks.
- Flooring, Open Steel**
Irving Iron Wks.
- Flooring, Steel Subway**
Irving Iron Wks.
- Flooring, Ventilating**
Irving Iron Wks.
- Foglights**
Brill Co., J. G., The
Standard Steel Wks.
- Frogs & Crossings, Tee Rail**
Ramapo Ajax Corp.
- Frogs, Track (See Track Work)**
- Frogs, Trolley**
Ohio Brass Co.
- Fuses and Fuse Boxes**
Consolidated Car Heat. Co.
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.
- Fuses, Refillable**
General Electric Co.
Johns-Manville, Inc.
- Gaskets**
Johns-Manville, Inc.
Westinghouse Tr. Br. Co.
- Gas Producers**
Westinghouse E. & M. Co.
- Gas-Electric Cars**
General Elec. Co.
Westinghouse E. & M. Co.
- Gasoline Torches**
Economy Elec. Devices Co.
- Gates, Car**
Brill Co., The J. G.
- Gear Blanks**
Brill Co., J. G., The
Standard Steel Wks.
- Gear Cases**
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
- Gears and Pinions**
Bemis Car Truck Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.
- Generating Sets, Gas-Electric**
General Electric Co.
- Generators**
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.
- Glider Rails**
Lorain Steel Co.
- Gong (See Bells and Gongs)**
- Grating, Steel Subway**
Irving Iron Wks.
- Greases (See Lubricants)**
- Guard Rail Clamps**
Ramapo Ajax Corp.
- Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.
- Guards, Trolley**
Elec. Service Supplies Co.
Ohio Brass Co.
- Haps, Trolley**
Elec. Service Supplies Co.
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works
- Headlights**
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
- Headlining**
Haskelite Mfg. Co.
Pamelyte Co.
- Heaters for Special Purposes**
Power Specialty Co.
- Heaters, Car (Electric)**
Consolidated Car Heat. Co.
Economy Elec. Devices Co.
Gold Car Heat. & Lig. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter
- Heaters, Car, Hot Air and Water**
Elec. Service Supplies Co.
Smith Heater Co., Peter
- Hydraulic Machinery**
Allis-Chalmers Mfg. Co.
- Industrial Flooring**
Johns-Manville, Inc.
- Instruments Measuring, Testing and Recording**
Economy Elec. Devices Co.
Elec. Service Supplies Co.
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.
- Insulating Cloth, Paper and Tape**
General Electric Co.
Irvington Varnish & Ins. Co.
Johns-Manville, Inc.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.
- Insulating, Silk & Varnish**
Irvington Varnish & Ins. Co.
- Insulation (See also Paints)**
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

**COST MORE PER BRUSH
COST LESS PER CAR MILE**

W. J. Jeandron
345 Madison Avenue, New York

Pittsburgh Office: 634 Wabash Bldg.

Chicago Office: 1657 Monadnock Block

San Francisco Office: 525 Market Street

Canadian Distributors: Lyman Tube & Supply Co., Ltd.,
Montreal and Toronto

BRAKE SHOES

**AERA Standards
Brake Heads**



Diamond "S" Steel Back and Lug Shoes
best for all equipment.

Manufactured and sold under U. S.
Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York

332 So. Michigan Ave., Chicago

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life **WITHOUT INJURY TO THE WIRE**. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the **LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD**.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.



We make a specialty of
**ELECTRIC RAILWAY
LUBRICATION**

We solicit a test of TULC
on your equipment

The Universal Lubricating Co.

Cleveland, Ohio

Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City



Electrical Insulation and Headlinings
THE PANELYTE COMPANY, Trenton, N. J.

*Only reliable products
can be continuously
advertised*

"Axle Specialists Since 1866"
Address all Mail to Post Office Box 515, Richmond, Va.

CAR AXLES
J. R. JOHNSON AND CO., INC.
FORGED STEEL AXLES

For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or
Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large
Shafts, Round Bars, etc.

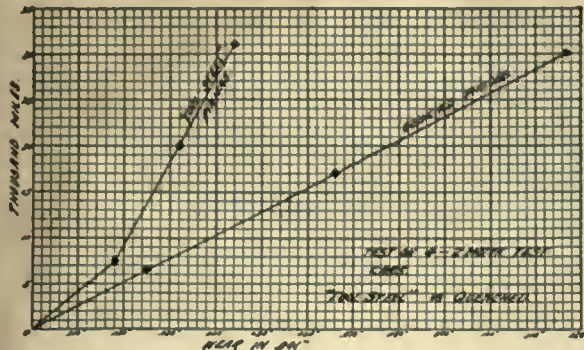


CHILLINGWORTH

One-Piece Gear Cases
Seamless—Riveted—Light Weight
Best for Service—Durability and
Economy. Write Us.

Chillingworth Mfg. Co.
Jersey City, N. J.

- Johns-Manville, Inc.
Okonite Co.
Westinghouse E. & M. Co.
- Insulation Slits**
Irvington Varnish & Ins. Co.
- Insulators (See also Line Materials)**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.
- Insulator Pins**
Elec. Service Supplies Co.
Hubbard & Co.
- Jacks (See also Cranes, Hoists and Lifts)**
Buda Company
Elec. Service Supplies Co.
- Joints, Rail**
(See Rail Joints)
- Journal Boxes**
Bemis Car Truck Co.
Brill Co., J. G.
- Junction Boxes**
Horne & Ebling Corp.
Std. Underground Cable Co.
- Lamps, Guards and Fixtures**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Arc and Incandescent (See also Headlights)**
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Signal and Marker**
Nichols-Lintern Co.
Ohio Brass Co.
- Lanterns, Classification**
Nichols-Lintern Co.
- Lightning Protection**
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.
- Line Material (See also Brackets, Insulators, Wires, etc.)**
Archbold-Brady Co.
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
Johns-Manville, Inc.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.
- Locomotives, Electric**
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
- Lubricating Engineers**
Galena Signal Oil Co.
Texas Co.
- Lubricants, Oil and Grease**
Galena Signal Oil Co.
Texas Co.
- Universal Lubricating Co.**
- Manganese Parts**
Bemis Car Truck Co.
- Manganese Steel Guard Rails**
Ramapo Ajax Corp.
- Manganese Steel Switches, Frogs & Crossings**
Ramapo Ajax Corp.
- Meters (See Instruments)**
- Molding, Metal**
Allis-Chalmers Mfg. Co.
- Motor Buses (See Buses, Motor)**
- Motors, Electric**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.
- Motors and Generators, Sets**
Allis-Chalmers Mfg. Co.
General Electric Co.
- Motor-men's Seats**
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.
- Nuts and Bolts**
Bemis Car Truck Co.
Hubbard & Co.
- Oil Heaters**
Power Specialty Co.
- Oils (See Lubricants)**
- Omnibuses (See Buses, Motor)**
- Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)**
- Packing**
Elec. Service Supplies Co.
Johns-Manville, Inc.
Westinghouse E. & M. Co.
- Paints and Varnishes (In-cluding)**
Irvington Varnish & Ins. Co.
- Paints and Varnishes for Woodwork**
National Ry. Appliance Co.
- Pavement Breakers**
Ingersoll-Rand Co.
- Paving Guards, Steel**
W. S. Godwin Co., Inc.
- Paving Material**
Amer. Br. Shoe & Fdy. Co.
- Pickup, Trolley Wire**
Elec. Service Supplies Co.
Ohio Brass Co.
- Pinion Pullers**
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.
- Pinions (See Gears)**
- Pins, Case Hardened, Wood and Iron**
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.
- Pipe**
National Tube Co.
- Pipe Fittings**
Standard Steel Wks.
Westinghouse Tr. Brake Co.
- Planers (See Machine Tools)**
- Plates for Tee Rail Switches**
Ramapo Ajax Corp.
- Pliers, Rubber Insulated**
Elec. Service Sup. Co.
- Pole Line Hardware**
Ohio Brass Co.
- Poles, Metal Street**
Elec. Ry. Equipment Co.
Hubbard & Co.
Truscon Steel Co.
Western Electric Co.
- Pole Reinforcing**
Hubbard & Co.
- Poles & Ties Treated**
Bell Lumber Co.
International Creosoting & Construction Co.
Weyerhaeuser Sales Co.
- Poles, Ties, Posts, Piling & Lumber**
Bell Lumber Co.
International Creosoting & Construction Co.
Weyerhaeuser Sales Co.
- Poles, Trolley**
Bell Lumber Co.
Elec. Service Supplies Co.
National Tube Co.
Nuttall Co., R. D.
Truscon Steel Co.
- Poles, Tubular Steel**
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
National Tube Co.
Truscon Steel Co.
- Portable Grinders**
Buda Company
- Potholes**
Okonite Co.
- Power Saving Devices**
Economy Elec. Devices
National Ry. Appliance Co.
- Pressure Regulators**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Pumps**
Allis-Chalmers Mfg. Co.
- Pumps Vacuum**
Ingersoll-Rand Co.
- Punches, Ticket**
Intern'l Register Co., The
Wood Co., Chas. N.
- Rail Braces & Fastenings**
Ramapo Ajax Corp.
- Rail Piler**
Philip Carey Co.
- Rail Grinders (See Grinders)**
- Rail Joints**
Carnegie Steel Co.
Rail Joint Co.
- Rail Joints—Welded**
Lorain Steel Co.
- Rails, Relaying**
Foster Co., L. B.
Hymann-Michaels Co.
- Rails, Steel**
Carnegie Steel Co.
Foster Co., L. B.
- Railway Paving Guards, Steel**
Godwin Co., Inc., W. S.
- Railway Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.
- Rattan**
Brill Co., The J. G.
Elec. Service Supplies Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
- Recallmers, Waste & Oil**
Oil & Waste Saving Machine Co.
- Registers and Fittings**
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Rooke Automatic Register Co.
- Reinforcement, Concrete**
Amer. Steel & Wire Co.
- Repair Shop Appliances (See also Coil Banding and Winding Machines)**
Elec. Service Supplies Co.
- Repair Work (See also Coils)**
General Electric Co.
Westinghouse E. & M. Co.
- Replacers, Car**
Elec. Service Sup. Co.
- Resistances**
Consolidated Car Heat. Co.
- Resistance, Wire and Tube**
General Electric Co.
Westinghouse E. & M. Co.
- Retrievers, Trolley (See Catchers and Retrievers, Trolley)**
- Rheostats**
General Electric Co.
Westinghouse E. & M. Co.
- Roofing Asbestos (Car)**
Johns-Manville, Inc.
- Roofs**
Haskelite Mfg. Co.
- Sanders, Track**
Brill Co., The J. G.
Elec. Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
- Sash Fixtures, Car**
Brill Co., The J. G.
Horne & Ebling Corp.
- Scrapers, Track (See Cleaners and Scrapers, Track)**
- Screw Drivers, Hubber Insulated**
Elec. Service Sup. Co.
- Seats, Bus**
Brill Co., The J. G.
Heywood-Wakefield Co.
St. Louis Car Co.
- Seats, Car (See also Rattan)**
Brill Co., The J. G.
Heywood-Wakefield Co.
St. Louis Car Co.
- Seating Materials**
Brill Co., J. G.
Heywood-Wakefield Co.
- Second Hand Equipment**
Electric Equipment Co.
Hymann-Michaels Co.
Transit Equipment Co.
- Shades, Vestibule**
Brill Co., The J. G.
- Shovels**
Brill Co., The J. O.
Hubbard & Co.
- Side Bearings (See Bearings, Center and Side)**
- Signals, Car Starting**
Consolidated Car Heat. Co.
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.
- Signals, Indicating**
Nichols-Lintern Co.
- Signal Systems, Highway Crossing**
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
Wood Co., Chas. N.
- Signal Systems, Block**
Elec. Service Sup. Co.
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
- Slack Adjusters (See Brake Adjusters)**
- Steel Wheels and Cutters**
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
- Smokestacks, Car**
Nichols-Lintern Co.
- Sockets & Receptacles**
National Metal Molding Co.
- Snow-Plows, Sweepers and Brooms**
Brill Co., The J. G.
Consolidated Car Fender Co.
McGuire-Cummings Mfg. Co.
- Sockets & Receptacles**
Johns-Manville, Inc.
- Soldering and Brazing Apparatus (See Welding Processes and Apparatus)**
Irvington Varnish & Ins. Co.
- Special Adhesive Papers**
Irvington Varnish & Ins. Co.
- Special Trackwork**
Lorain Steel Co.
- Spikes**
Amer. Steel & Wire Co.
- Splicing Compounds**
Westinghouse E. & M. Co.
- Splicing Sleeves (See Clamps and Connectors)**
- Springs, Car and Truck**
American Steel Foundries
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
St. Louis Car Co.
Standard Steel Wks. Co.
- Sprinklers, Track and Road**
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
- Stair Steps, Safety**
Irving Iron Wks.
- Steel and Steel Products**
Carnegie Steel Co.
- Steps, Car**
Brill Co., The J. G.
Morton Mfg. Co.
- Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse E. & M. Co.
- Stop Signals**
Nichols-Lintern Co.
- Storage Batteries (See Batteries, Storage)**
- Strain, Insulators**
Anderson, A. & J. M. Mfg. Co.
Ohio Brass Co.
- Strand**
Roebbling's Sons Co., J. A.
- Streetscars, Noiseless**
Lightweight, Noiseless Electric Streetcar Co.
- Superheaters**
Babcock & Wilcox Co.
Power Specialty Co.
- Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**
- Switchboxes**
Johns-Manville, Inc.
- Switches, Safety**
Johns-Pratt Co.
- Switches, Selector**
Nichols-Lintern Co.
- Switches, Tee Rail**
Ramapo Ajax Corp.
- Switches, Track (See Track Special Work)**
- Switches and Switchboards**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Tapes and Cloths (See Insulating Cloth, Paper and Tape)**
- Tee Rail Special Track Work**
Ramapo Ajax Corp.
- Telephones and Parts**
Elec. Service Supplies Co.
Western Electric Co.
- Terminals, Cable**
Std. Underground Cable Co.
- Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**
- Thermostats**
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter
- Ticket Choppers & Destroyers**
Elec. Service Supplies Co.
- Ties, Mechanical**
Dayton Mechanical Tie Co.
- Ties and Tie Rods, Steel**
Carnegie Steel Co.
Godwin Co., Inc., W. S.
International Steel Tie Co.
- Ties, Wood (Cross (See Poles, Ties, Posts, etc.)**
- Tires, Buses**
General Tire & Rubber Co.
- Tools, Track & Miscellaneous**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Hubbard & Co.
- Torches, Acetylene (See Cutting Apparatus)**
- Towers and Transmission Structures**
Archbold-Brady Co.
Westinghouse E. & M. Co.
- Trackless Trolley Cars**
Brill Co., The J. G.
St. Louis Car Co.
- Track, Special Work**
Buda Company
N. Y. Switch & Crossing Co.
- Transfer (See Tickets)**
- Transfer Tables**
American Bridge Co.
- Transformers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.
- Treads, Safety, Stair, Car**
Step
Morton Mfg. Co.
- Trolley Bases**
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Ohio Brass Co.
- Trolley Bases, Retrieving**
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.
- Trolley Buses**
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.
- Trolley Material, Overhead**
Anderson, A. & J. M. Mfg. Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
- Trolley Shoe**
Miller Trolley Shoe Co.
- Trolley Wheel Bushings**
More-Jones Brass & Metal Co.
- Trolley Wheels & Harps**
More-Jones Brass & Metal Co.
- Thornton Trolley Wheel Co.**
- Trolley Wheels (See Wheels, Trolley)**
- Trolley Wire**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebbling's Sons Co., J. A.
Western Electric Co.
- Trucks, Car**
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Taylor Elec. Truck Co.
- Tubing, Steel**
National Tube Co.
- Tubing, Yellow & Black**
Flexible Varnish
Irvington Varnish & Ins. Co.
- Turbines, Steam**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Turbines, Water**
Allis-Chalmers Mfg. Co.
- Turnstiles**
Elec. Service Supplies Co.
Perey Mfg. Co., Inc.
- Valves**
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Varnished Papers & Silks**
Irvington Varnish & Ins. Co.
- Ventilators, Car**
Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.
- Welded Rail Joints**
Alumino-Thermic Corp.
Ohio Brass Co.
- Welders, Portable Electric**
Ohio Brass Co.
- Welding Processes and Apparatus**
Alumino-Thermic Corp.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Wheel Guards (See Fenders and Wheel Guards)**
- Wheel Presses (See Machine Tools)**
- Wheels, Car, Cast Iron**
Bemis Car Truck Co.
Carnegie Steel Co.
Griffin Wheel Co.
- Wheels, Car, Steel & Steel Tire**
American Steel Foundries
Standard Steel Wks.
- Wheels, Wrought Steel**
Carnegie Steel Co.
- Wheels, Trolley**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
- Wiring, Star Brass Works**
Nuttall Co., R. D.
- Whistles, Air**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Wire Rope**
Roebbling's Sons Co., J. A.
- Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Roebbling's Sons Co., J. A.
Western Electric Co.
Westinghouse E. & M. Co.
Std. Underground Cable Co.



This chart shows the relative wear on test cars equipped with "Tool Steel" vs. Inched pinions.

The maker of the Inched pinions claimed they were "as good as Tool Steel." Four pinions of each make were tested and measured for wear with micrometers.

The above chart shows the result.

Tool Steel Quality

The Tool Steel Gear and Pinion Co.
CINCINNATI, O.



"Differential Two-Cor Train. Trailer dumping load clear of trench."

DIFFERENTIAL CARS

Standard on Fifty Railways for

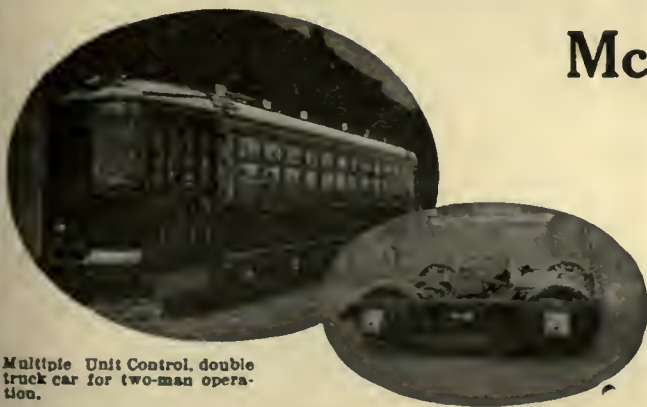
- | | |
|--------------------------------|--------------------|
| Track Maintenance | Track Construction |
| Ash Disposal | Hauling Crossties |
| Placing Ballast | Disposal of Waste |
| Coal Hauling | Snow Disposal |
| Concrete Materials to the Job | |
| Excavated Material to the Dump | |

For Economy

- THE CLARK CONCRETE BREAKER
- THE DIFFERENTIAL BOTTOM DUMP CAR
- THE DIFFERENTIAL COMBINATION
- CAR-WHEEL TRUCK and TRACTOR

THE DIFFERENTIAL STEEL CAR CO.

Findlay, Ohio, U. S. A.



Multiple Unit Control, double truck car for two-man operation.

McGUIRE-CUMMINGS

Manufacturing Company

General Offices

111 W. Monroe St., Chicago, Ill.

Street Cars, Trucks Snow Sweepers

Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

**FOR POSITIVE SATISFACTION ORDER
SILVER LAKE**

If you are not familiar with the quality you will be surprised at its **ENDURANCE** and **ECONOMY**.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY

Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts



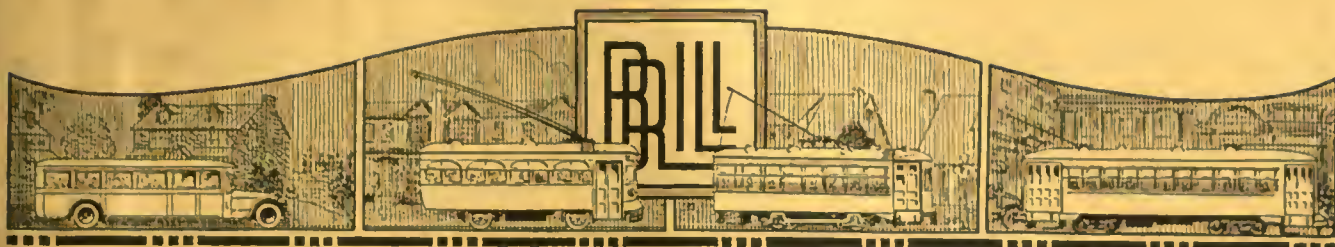
MORE-JONES "TIGER"BRONZE AXLE & ARMATURE BEARINGS

Strong - tough - durable
anti-frictional
economical

MORE-JONES BRASS & METAL CO

ST. LOUIS

MISSOURI



Lubricated Brake Rod Castings



Easy Adjustment

Master Mechanics will readily recognize the advantages of this new type Brill Brake Rod Casting. With the lever end closed the threaded brake rod is protected from dirt, water and snow, and being lubricated is safeguarded against the ravages of rust. Instead of difficulty due to the brake rod rusting tight, an experience familiar to many

railway shops, brake adjustment is easily accomplished.

Brake Rods with this closed type casting can readily be installed in place of those having the open end type.

Jam nuts and spring washers are unnecessary when used in conjunction with Brill Automatic Slack Adjusters.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
 AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MAN'G CO.
 ST. LOUIS, MO. — CLEVELAND, OHIO. — SPRINGFIELD, MASS.





Terminal improvement under way in Chicago

THE Illinois Central has added its name to the list of railroad electrifications—to the list of high-voltage direct-current electrifications using 1500 volts.

Thirty seven route-miles of heavy-traffic suburban line out of Chicago will begin electrical operation next year.

For the initial installation of 120 two-car equipments General Electric will supply 100 per cent of the multiple-unit control equipment and 100 per cent of the compressors and governors, as well as half of the motors.

GENERAL ELECTRIC

GENERAL ELECTRIC CO., SCHENECTADY, N. Y., SALES OFFICES IN ALL LARGE CITIES

ELECTRIC RAILWAY JOURNAL

HOUSTON PUBLIC LIBRARY
LYCEUM AND GALLERIE BRANCH
HOUSTON, TEXAS.



A large Reo Passenger Bus equipped with U. S. Bus-Truck Tires to insure maximum cushioning and traction on severe road conditions

U. S. Royal Cord Bus-Truck Tires —first in meeting the bus operators' tire needs

FROM the time the first motor passenger bus was designed the United States Rubber Company has kept pace with the amazing development in bus transportation.

It was the first in the field with a pneumatic tire definitely and specifically built for bus service.

The first to put the name "bus" on the tire.

This tire, announced over a year ago, has grown rapidly in popularity with owners and operators of passenger fleets.

It is *not* an enlarged passenger tire. It is a *real* heavy duty pneumatic. Its carcass is built of Latex-treated Web-Cord.

Its tread has full tractive qualities and non-skid properties over a long service life.

Sprayed Rubber—pure, uniform, easily vulcanized and of great strength and elasticity is used throughout in its construction.

U. S. Royal Cord Bus-Truck Tires are built in all bus sizes from 32 x 4½ to 40 x 8 inclusive.



Trade Mark

Please Note—

The U. S. Tire Technical Service Division has experts in all sections of the country making a careful day-to-day survey of bus operations from a tire standpoint.

Bus operators are invited to utilize the information available through this research to aid them in selecting their tire equipment.

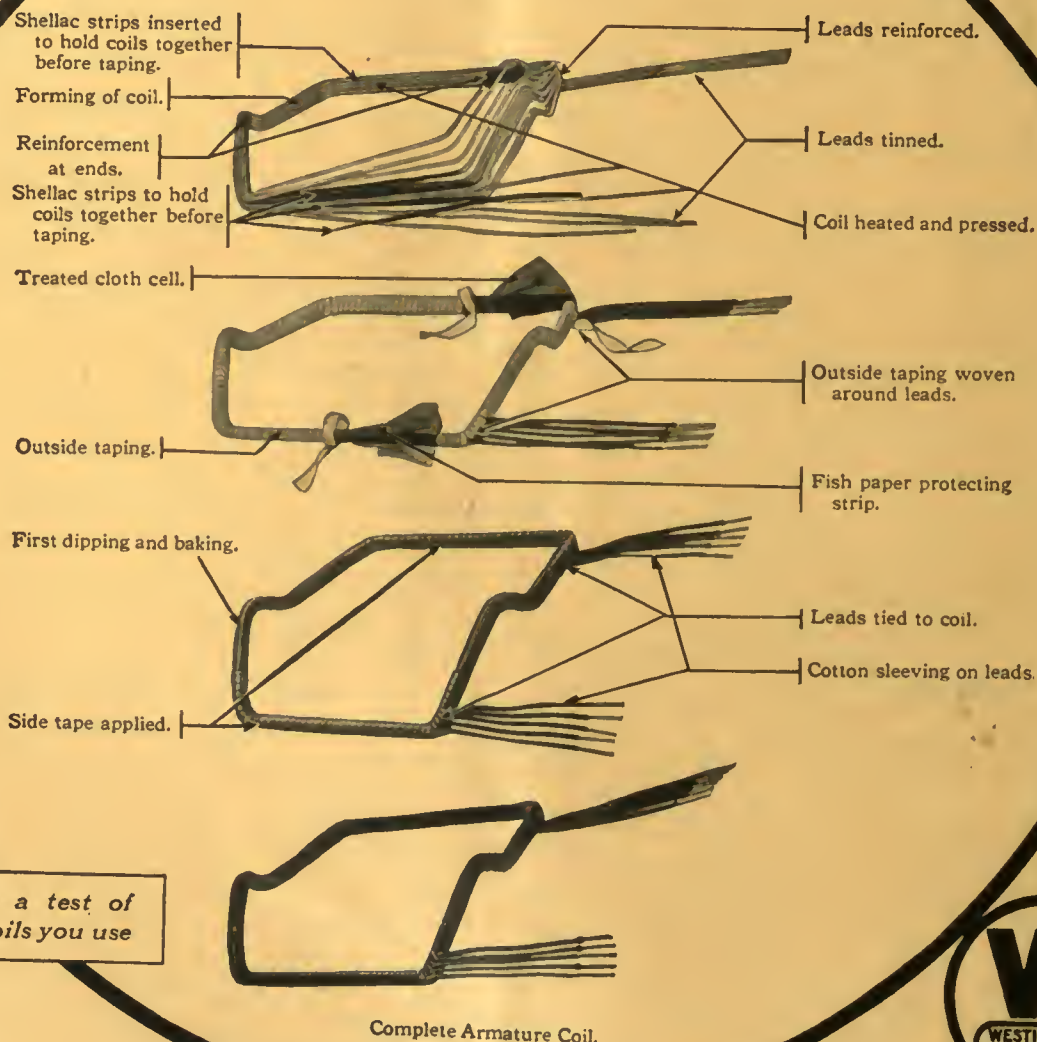
United States Rubber Company

UNITED STATES BUS TIRES ARE GOOD TIRES

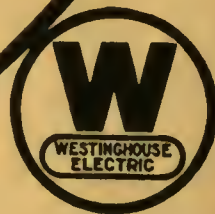
LIFE

is a question of constitution— not of looks

The life of Westinghouse Armature Coils is long—They have a strong constitution, because of the quality of their construction.



Make a test of
the coils you use



Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries

Westinghouse

JOHN A. MILLER, Jr.
Associate Editor
C. W. SQUIER
Associate Editor
G. J. MACMURRAY
News Editor

ELECTRIC RAILWAY JOURNAL

MORRIS BUCK, *Managing Editor*

HENRY W. BLAKE
Senior Editor
CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

CONTENTS

FEBRUARY 21, 1925

Editorials	283
Managing Director Appointed for American Association	285
Advisory council recently formed by executive committee creates new office. Lucius B. Storrs, selected to fill this important new position, is widely known in the industry. Appointment effective April 2.	
Transportation Topics Considered at Midyear Meeting.	286
Fares, merchandising methods, improving the quality of service, and the place of the bus were among the subjects discussed by prominent speakers at Washington. Attendance was unusually large.	
The Car Rider's Viewpoint.....	289
By PETER WITT.	
Transportation Acts and the Electric Railways.....	290
By JOHN J. ESCH.	
One Railway's Experience with Buses.....	291
By S. B. WAY.	
Manufacturer's Contribution to the Electric Railway...293	
By JOHN G. BARRY.	
Relation Between Automotive and Electric Railway Industries	294
By T. R. DAHL.	
Opportunities and Responsibilities of the Railway Executive	295
By G. E. HAMILTON.	
Both Buses and Cars Are Needed.....	296
By GUY E. TRIPP.	
Transportation Men Should Run Transportation Systems	297
By MATTHEW C. BRUSH.	
Many Committees Meet in Washington.....	299
American, Engineering, Claims and T. & T. executive committees head list of 18 sessions held in connection with Midyear Meeting. Much important business transacted.	
Census Report Shows Status of Electric Railways.....	305
Tables and other statistics from the census report just made public give interesting facts about the growth in traffic of the electric roads between 1917 and 1922.	
News of the Industry.....	311
Financial and Corporate	317
Personal Mention	320
Manufactures and the Markets.....	321

McGRAW-HILL COMPANY, INC.

Tenth Avenue at 36th Street, New York

JAMES H. MCGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MUIR, Vice-President
E. J. MURPHY, Vice-President
MASON BRITTON, Vice-President
JAMES H. MCGRAW, Jr., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary

WASHINGTON:
Colorado Building
CHICAGO:
Old Colony Building
PHILADELPHIA:
Real Estate Trust Building
CLEVELAND:
Leader-News Building
ST. LOUIS:
Star Building
SAN FRANCISCO:
863 Mission Street
LONDON:
6 Haverle Street, London, E. C. 4
Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations



Cable Address: "Machinist, N. Y."

Publishers of
Engineering News-Record
American Machinist
Power
Chemical and Metallurgical Engineering
Coal Age
Engineering and Mining Journal-Press
Ingenieria Internacional
Bus Transportation
Electric Railway Journal
Electrical World
Electrical Merchandising
Radio Retailing
Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
American Machinist—European Edition
(Published in London)

The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries \$2 (total \$7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 26 cents.

Change of Address—When change of address is ordered, the new and the old address must be given, notice to be received at least ten days before the change takes place. Copyright, 1925, by McGraw-Hill Company, Inc. Published weekly. Entered as second-class matter, June 22, 1908, at the Post Office at New York, under the Act of March 3, 1879. Printed in U.S.A.

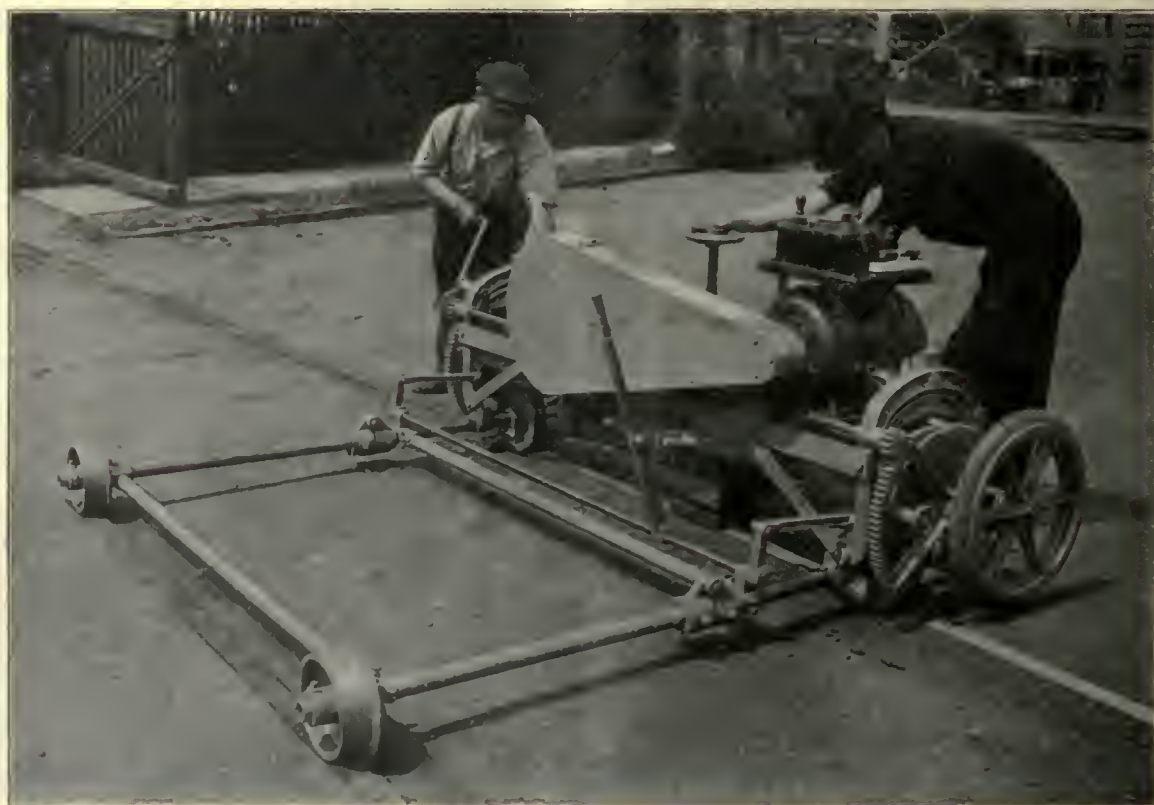
270,000 Words

A CONSERVATIVE estimate of the number of words spoken during the official sessions of the two-day Midyear Meeting held at Washington Monday and Tuesday of this week would be approximately 270,000. To publish in full the remarks of the various speakers would require some 170 pages of ELECTRIC RAILWAY JOURNAL size, averaging 1,600 words to the page.

Instead of presenting this material to its readers in that way the JOURNAL has abstracted and condensed the reports of the proceedings into 20 pages in this issue. A vast amount of work was involved in this process. All of the proceedings were of interest and careful weighing was necessary to determine which portions were of such outstanding importance that they should become part of the permanent record of the industry.

Such condensation, we believe, will make the story of the meeting readily available to railway men who were unable to attend. Few would have time to read 170 pages, but any one can easily read 20. If more general interest in the proceedings of the meeting results from this effort the JOURNAL will feel amply repaid.

Add a "VULCAN" Rail Joint Grinder to your equipment



It's Reciprocating

Fits in between the big "Reciprocating" and the rotary grinders. Planes the rail with an abrasive brick. Produces a true smooth rail where joints were uneven. Fine, too, for finishing off after

the rotating grinders have removed surplus welding metal. Derails as quickly and easily as our "Atlas"—off-again, on-again, grind-again in seconds. You'll find it a paying investment.

*Get a description and a quotation
at the same time*

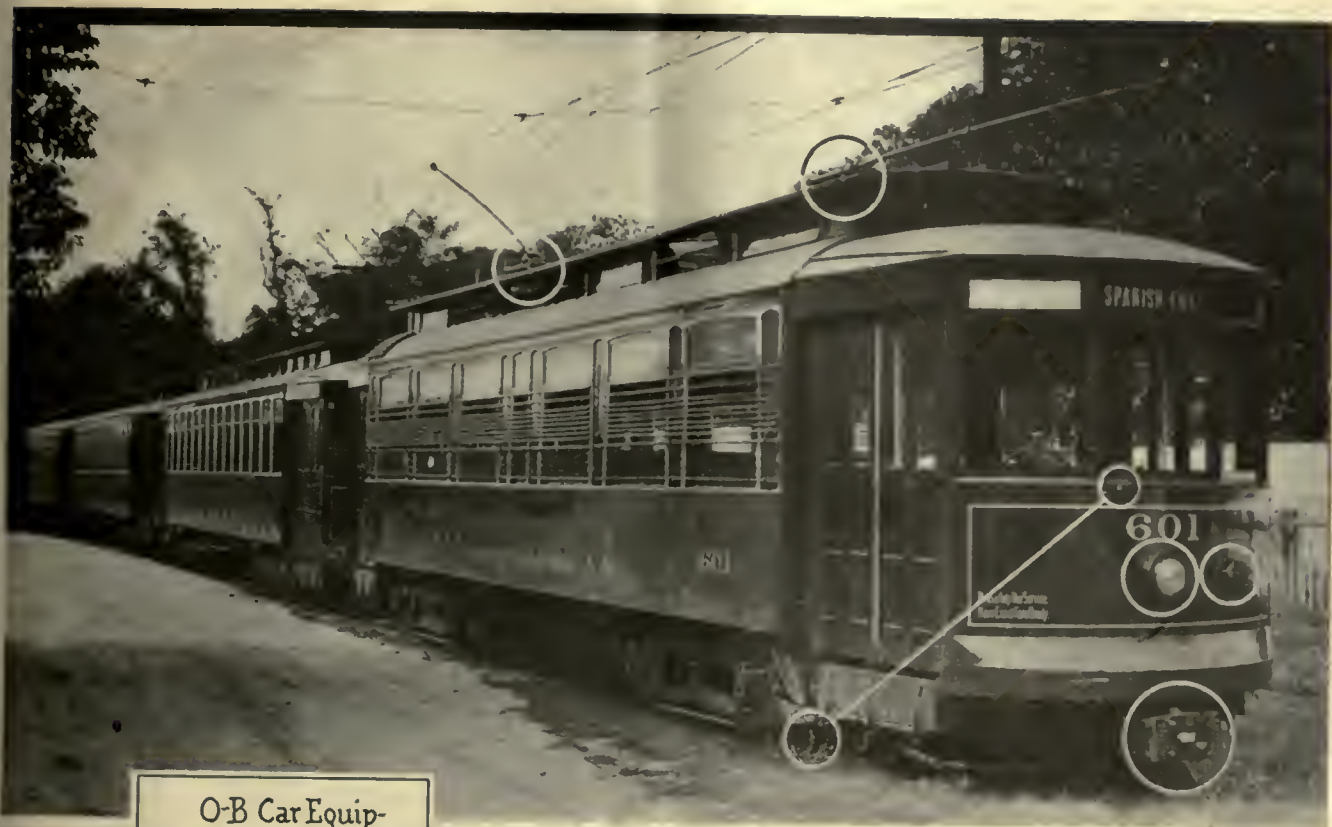
Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

AGENTS:

Chester F. Gailor, 30 Church St., New York.
Chas. N. Wood Co., Boston

Atlas Railway Supply Co. Chicago
Equipment & Engineering Co., London
Electrical Engineering & Mfg. Co., Pittsburgh



O-B Car Equip-
ment Specialties
on New Orleans
Cars.

Tomlinson Auto-
matic Couplers
Form 1 Trolley Bases
Imperial Headlights
Trolley Catchers
Sander Equipment

O-B in New Orleans

New Orleans believes in O-B. The New Orleans Public Service, Inc., is standardized on O-B Car Equipment Products. These cars, recent additions, are 100% O-B equipped because their selection was based on service records gathered in operating experience with the older rolling stock.

The Ohio Brass Co.
Mansfield, Ohio



O-B
CAR EQUIPMENT



Poles and Public Contact

No part of Utility owned property is in as constant close contact with the Public as its pole installations. Bates Steel Poles are sturdy, trim, and attractive in appearance and impress the bond buying Public with the substantial building and permanence of the Utility property.



Expanded
—
No Rivets,
Bolts or
Welds
—
One-Piece

The illustration is of the line of the Grand Rapids Street Railway Company of Grand Rapids, Mich.

Permanent, long-lived, economical construction is to be had, even at low initial cost. There is a Bates Pole which will efficiently meet your specific requirements.

Our recommendations will prove of great value to you and we will appreciate the opportunity of submitting them.

Expanded Poles, Fabricated Towers or Substations—Painted or Galvanized

Bates **E**xpanded **S**teel **T**russ **C**o.

231 SOUTH LA SALLE ST., CHICAGO, ILL.

If your general manager says:

“What About Steel Ties”

The first cost is low { Steel Twin Ties cost about One Dollar per track foot at Cleveland.
Economy of concrete and grading make the complete track cost less than any other concrete design.

The construction is renewable { Steel Twin Tie Construction provides a permanent foundation on which a complete and approved method of rail renewal has been worked out on over five miles of track.

The structure is uniform { A combination of track foundation and paving, uniform in its action under both car and vehicle traffic.
The coefficient of expansion of steel and concrete are nearly identical.

New methods of installation { New methods of initial installation, designed to insure complete bearing, eliminate shrinkage and make rail renewal easy.

Experience of users can be obtained { Fourteen years of experience as to service, together with initial and maintenance cost is now available.

*Your quotation, accompanying the complete folder on Steel Ties,
is based on a stock of steel which guarantees you
a firm price on Steel Ties for the
first half of the year*

THE INTERNATIONAL STEEL TIE COMPANY, CLEVELAND

Steel Twin Tie Track

Renewable Track . . . Permanent Foundation



Sell them Safety with their Ride

The greatest of all universal appeals is that of personal safety. Every traveller is anxious to reach his destination in SAFETY, while riding comfortably and quickly.

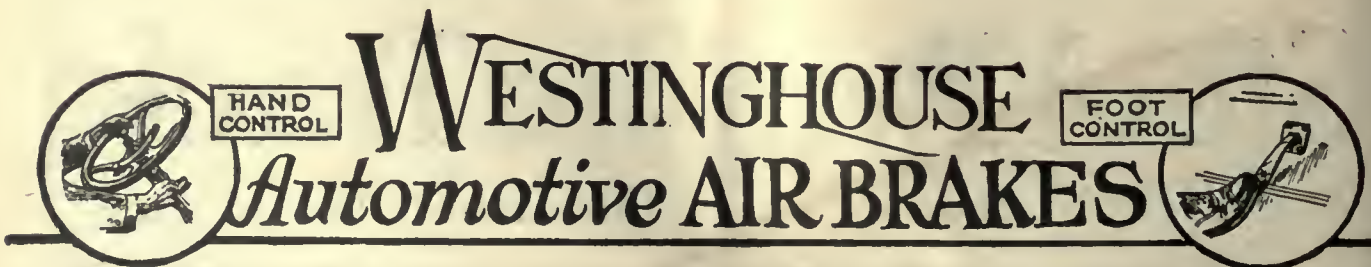
If your buses are equipped with Westinghouse Air Brakes you are able to offer the public a degree of security which is at once understood and appreciated by all who ride the street cars. They will then have the accustomed assurance of not only buying a ride, but a full measure of Safety, as well.

You, too, can enjoy the increased prestige and profits which other bus operators are enjoying through the use of Westinghouse Automotive Air Brakes.



Westinghouse Automotive Air Brakes are completely described in our Publication 9058, a new edition of which is just off the press. Ask for your copy.

WESTINGHOUSE TRACTION BRAKE CO.
Automotive Division, Wilmerding Pa.



PEERLESS PINION PULLER



Weight, only 50 lbs.

Convenient handle for carrying

**No matter how tight it's
frozen on—**

even the most stubborn pinion will give way to the Peerless Pinion Puller. Mechanics need this great force to start the pinions from their frozen fit on the shaft.

The Peerless Pinion Puller has been developed to meet this need. Do not waste your time and risk your equipment by hammering. It's dangerous as well as slow.

Use the one-man, portable, hydraulic Peerless. It does the job the efficient way.

Let us demonstrate this equipment

ELECTRIC SERVICE SUPPLIES Co.

PHILADELPHIA
17th and Cambria Sts.
PITTSBURGH
829 Oliver Building

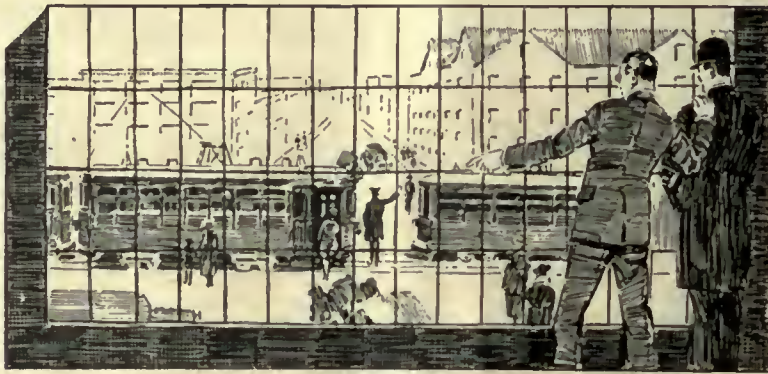
NEW YORK
50 Church St.
SCRANTON
318 N. Washington Ave.

CHICAGO
Monadnock Bldg.
BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver



Save Power with Lightweight **SAFETY CARS**



**“The Economy extends
even to the Power House”**



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

Postal and Telegraphic Address:

WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH





Milling machines in a bay of the National Pneumatic Plant at Rahway, N. J. When mechanical equipment is designed to facilitate the work of the operator it must be mechanically perfect. Great care is taken in machining N. P. Door and Step Controlling Mechanisms. We make sure that the N. P. solution of traffic-handling problems will not be complicated by mechanical troubles.

NATIONAL PNEUMATIC COMPANY

Executive Office, 50 Church Street, New York

General Works, Rahway, New Jersey

CHICAGO
McCormick Building

MANUFACTURER IN
TORONTO, CANADA

PHILADELPHIA
Colonial Trust Bulidng

Dominion Wheel & Foundries, Ltd.

Baseball

*No. 4 of a series showing
the utility of Mack Buses
during non-peak hours*



games — and other amusements

You can't park trolley cars!

And unless there happen to be special trackage and switching facilities, the handling of crowds at ball games and amusement parks is a troublesome problem to the electric railway company. The game may be scheduled to "break" at four and an extra inning keep the crowd till four-thirty. Then schedules are deranged and tie-ups occur all along the line.

That is when the flexibility of the bus scores heavily. For buses can be parked "around the block" and wait until the game, or the circus or movie or whatever it may be, is over without in any way interfering with schedule traffic, without having to make no-profit trips under a "special" sign, and without the necessity of circuitous re-routing.

When it comes to practical consideration of buses best suited to the needs of the electric railway field Mack design, construction and performance speak for themselves.

Mack engineers have worked out every detail for utmost economy in daily operation plus a superlative degree of passenger comfort. The Mack Bus is *all* bus:—

The powerful long-life improved Mack engine.

The Mack dual reduction drive axle, especially designed to give maximum road and under-body clearance.

The Mack transmission.

The specially designed low bus chassis.

The wide front axle, assuring safety and permitting a short turning radius.

The dual system of brakes on wheels and drive shaft.

All contribute to the long established low operating and maintenance records of Macks.

Mack Bus engineers will gladly cooperate with you.

MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY

25 BROADWAY

NEW YORK CITY

Eighty-eight direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

The Mack Bus



FAGEOL
SAFETY COACH

Repeat Orders are Eloquent Evidence of Satisfied Customers

The Central Transportation Company, a subsidiary of the Trenton & Mercer County Traction Corporation, has bought sixteen Fageol Safety Coaches on five different orders.

Their experience has been, like that of 34 other electric railways, that the Fageol Safety Coach excels in economy, dependability and passenger attractiveness.

We will be glad to give you full details, prices, terms and delivery dates on coaches that fit your needs.

*Territory West of the Rocky Mountains
served by*

Fageol Motors Company
Hollywood Blvd. at 107th Ave.
Oakland, California

*Territory East of the Rocky Mountains
served by*

The Fageol Motors Co. of Ohio
(In the Akron District)
Kent, Ohio





The Organization *behind* “Voltage Regulation!”

Almost since automobiles were experimental toys, Leece-Neville Company has been identified with the development, improvement and manufacture of standard automotive devices.

Our factory and home offices in Cleveland are adequately equipped for both quantity and quality production. An expert research and engineering staff is maintained with ample laboratory and testing facilities. A small closely-knit executive force exercises an interested personal control over the Company's activities.

In the field, an expert servicing organization covers the country. Permanent stations are established in over 200 different cities, well-distributed from Coast to Coast.

Backed by such an organization, Leece-Neville Equipment has established a standard of efficiency and satisfaction beyond the challenge of competition. Its standing in the automotive industry is comparable with that of the well-known standard makes of motors, controllers, heaters, door engines and similar equipment in the railway field.

THE LEECE-NEVILLE COMPANY
CLEVELAND, OHIO





“Accrued Depreciation is a fact to be ascertained by inspection”

The Courts, with the state public utility commissions, have learned much in the past decade about the methods and principles of property valuation. The recent decision, for instance, of Judge Lewis in the Denver Tramway case included an opinion that “depreciation is a fact to be ascertained by inspection.”

Arbitrary conclusions and rules-of-thumb cannot substitute for careful investigation in determining depreciation.

When An American Appraisal estimates the depreciation on trolley poles, for instance, at 12%, it means that this expresses an actual condition revealed by examining the poles for butt rot, split tops, sun cracks, hollow rot, and every other evidence of deterioration.

This type of analysis is typical of the manner in which depreciation as well as unit costs, overheads, and intangibles are treated in An American Appraisal. Facts rather than opinions are presented in evidence of its conclusions.

THE AMERICAN APPRAISAL COMPANY

Milwaukee

Atlanta
Baltimore
Boston
Buffalo
Chicago

Cincinnati
Cleveland
Detroit
Indianapolis
Los Angeles

Milwaukee
Minneapolis
New Orleans
New York
Philadelphia

Pittsburgh
San Francisco
St. Louis
Seattle
Syracuse

Washington
The Canadian
Appraisal Company, Ltd.
Montreal Toronto

Send for the American Appraisal pamphlet C-2

“Public Utility Valuation”

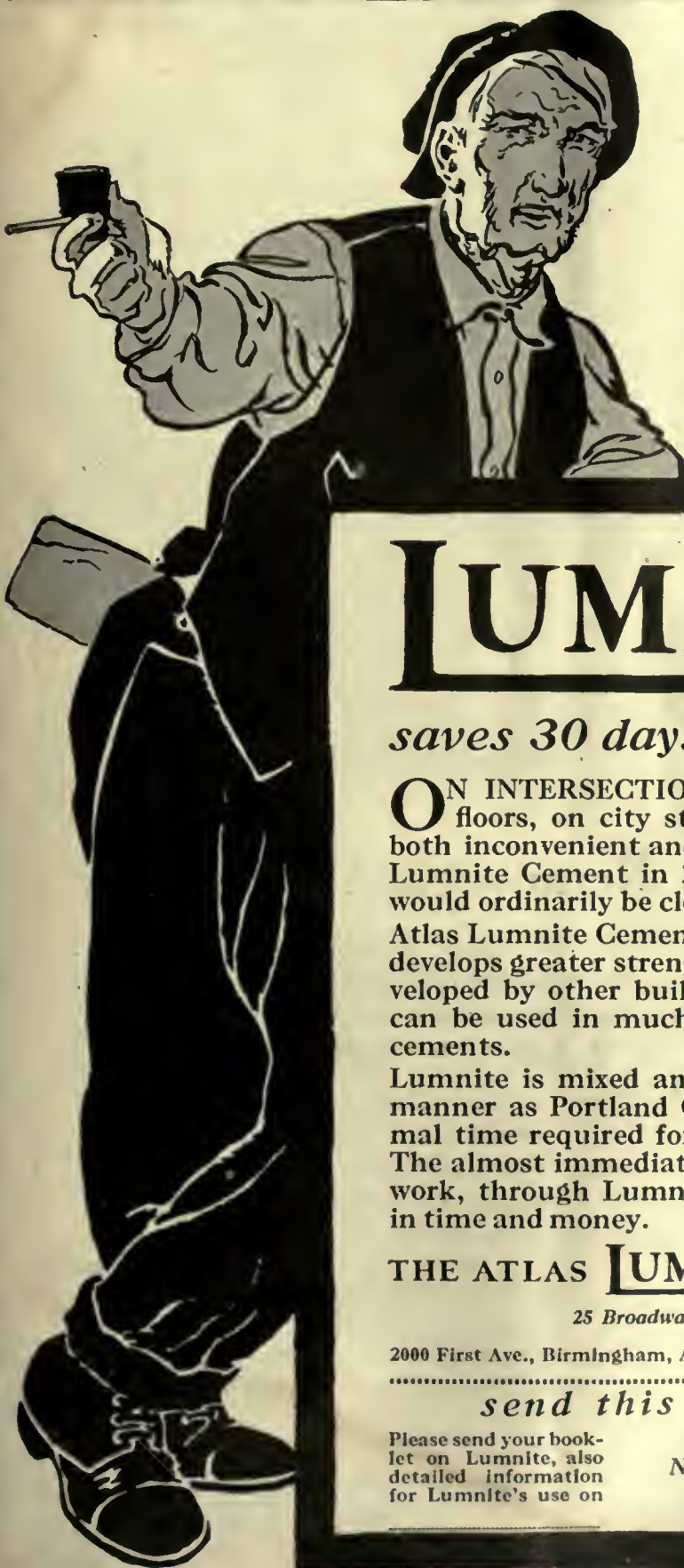
An American Appraisal

THE AUTHORITY

© 1925, The A. A. Co.

Investigations • Valuations • Reports • Industrials • Public Utilities • Natural Resources

28 day concrete—in 24 hours



LUMNITE

saves 30 days' detours

ON INTERSECTIONS of highways, on bridge floors, on city streets—wherever detours are both inconvenient and costly, concrete made with Lumnite Cement in 24 hours reopens roads that would ordinarily be closed for several weeks.

Atlas Lumnite Cement is a hydraulic cement that develops greater strength at 24 hours than that developed by other building cements at 28 days. It can be used in much colder weather than other cements.

Lumnite is mixed and manipulated in the same manner as Portland Cement and allows the normal time required for mixing and placing forms. The almost immediate use of any type of concrete work, through Lumnite, will effect big economies in time and money.

THE ATLAS **LUMNITE** CEMENT CO.

25 Broadway, NEW YORK CITY

2000 First Ave., Birmingham, Ala. 134 So. La Salle St., Chicago, Ill.

send this coupon today

Please send your booklet on Lumnite, also detailed information for Lumnite's use on

Name

Address

**Standard
for Modern G-E Motors
as follows**

GE-201	GE-260
GE-203	GE-263
GE-210	GE-264
GE-240	GE-265
GE-247	GE-275
GE-258	

**—and available
for these G-E Motors**

GE-57	GE-73
GE-67	GE-80
GE-70	GE-88



*Don't purchase supplies at random.
Use your G-E Catalog*

A Renewable Carbon-way

Do you replace worn brush-holder carbon-ways promptly as you should? Or do you continue operation with the worn part and risk a higher motor maintenance cost?

Many railway motors now in service have worn brush-holders that should be replaced. Replace them now with the new G-E Renewable Carbon-way Holder. Then in the future just the carbon-way, the worn part, can be renewed at about one fifth the cost of replacing a complete holder.

Quite a saving. And remember, the other results will be fewer motor failures and better service.



General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities



54C-24

GENERAL ELECTRIC

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

MORRIS BUCK, Managing Editor

Volume 65

New York, Saturday, February 21, 1925

Number 8

Railway Association Raised to New Plane of Usefulness

NO MORE important step has been taken by the American Electric Railway Association than that brought to fruition and announced at the Midyear Meeting in Washington, and for which the industry is primarily indebted to President Shannahan.

First, an advisory council has been formed which brings to the electric railways and to the association the active interest, support and direction of such outstanding men as these:

B. C. Cobb, Owen D. Young, Guy E. Tripp, Samuel Insull, Randal Morgan, Lucius S. Storrs, Henry G. Bradley, Nicholas F. Brady, Britton I. Budd, Frank R. Coates, Samuel M. Curwen, Frank L. Dame, Henry L. Doherty, Charles D. Emmons, Philip H. Gadsden, Thomas N. McCarter, Sidney Z. Mitchell, John H. Pardee, H. Hobart Porter, Paul Shoup, R. P. Stevens, Arthur W. Thompson and John N. Shannahan, president of the American Electric Railway Association, ex officio.

Second, the association activities are broadened by appointment of a managing director in the person of Lucius S. Storrs, president of the Connecticut Company, a past-president of the association and one of the foremost men of the industry.

The association in years past has done splendid work and has been a very constructive and helpful agency. But it has been apparent to many that its maximum possibilities were not being realized, and could not be, under the leadership of a president elected annually. The president has always been a railway executive whose primary duties lay with his property, the association necessarily being to him a secondary responsibility. However capable and far-seeing he was, he could not give the time to do the many bigger things for which there have been and will continue to be repeated opportunities. In other words, the industry has had no one who could represent it adequately before various public bodies, or who could take part in those local situations which, in their reaction and reflection throughout the entire industry, have so vital and important a national aspect.

Under the plan now adopted the industry will have one of its most successful executives, backed by the advisory council, as its permanent representative, and making it his sole duty to look after the interests of the electric railway business. This will naturally tend somewhat to relieve the president of duties which have come to demand more time and energy than could be devoted to them by an active railway executive. It should be remembered that the president of the association is selected from the country at large and not because his own headquarters are near those of the association. The association has been extremely fortunate in having presidents who have spent considerable time at headquarters, often at great personal sacrifice, but this condition cannot always prevail.

This, indeed, is the most important step the association has yet taken and no words of praise will be too glowing for the accomplishment of Mr. Shannahan.

Expense of New Association Plan of Small Importance

THERE are those who will see first the expense of this new plan of the association rather than the possible results. It will add expense, to be sure—but when this is spread over the industry, the amount needed from each company will be so small as to be negligible.

At the present time, it was felt that this expense could not be borne by the association out of its revenue from dues, inasmuch as the cost of the work heretofore done by the Committee of One Hundred has but recently been taken over by the association. This will consume most of the surplus the association has heretofore enjoyed. Rather than raise the dues, the advisory council members agreed to underwrite the cost of the expanded activities of the association which this move contemplates. Nevertheless, it is anticipated that the value of the work to be done will be so far-reaching that it will be enjoyed by the small companies as well as the large. Accordingly, the support of all companies, both railways and manufacturers, should be accorded if the plan is to come to full fruition, and they should be glad to relieve the underwriters of the burden they have assumed.

The JOURNAL is heartily in accord with the whole plan. It should be given full support and co-operation by the railways and the manufacturers of the industry generally.

Selecting the Right Man for Managing Director

AFTER the advisory council had agreed on the new plan of organization, attention turned to the work of obtaining for the position of managing director a man of outstanding ability. A new position of this character can only be as great as the man selected to fill it, for what it becomes depends almost entirely on what he makes of the opportunity. It was, therefore, no small task to select a man who would combine those attributes essential to obtain results—a man of vision, breadth of purpose, and depth of character, and one who had the confidence of the industry, of the financier and of the public.

To make the selection a yardstick was set up, and each man thought suitable was compared with it. Before the council was able to find a man who possessed the particular experience and ability considered essential, the thought came to those making the selection that there could be but one answer—why go afield if the one man, the yardstick, could be persuaded to take the position? So Mr. Storrs was approached, even

though it was felt that he would not consider severing his connections with the Connecticut Company, which he had served so ably. It was only because of the opportunity for greater service to the industry that he was willing to accept the newly created position.

In Mr. Storrs are combined those qualities that are needed for leadership. He has successfully piloted one of the largest railways in this country through the most difficult period in the history of the industry. In turn, he has displayed the patience and tact necessary to solve harassing problems by negotiations and the indomitable fighting spirit needed to insure victory when the situation has passed beyond the point of mediation. No better indication of his executive ability can be found than the high esteem in which he is held by his fellow workers in the industry and by the general public in the territory where his company is located.

Partial Relief of Traffic Congestion Can Be Had at Once

ABOLITION of left-hand turns wherever possible was favored by the committee on relief of traffic congestion of the Transportation & Traffic Association at the Midyear Meeting in Washington. In the past it has been claimed by those wishing to permit left-hand turns that congestion is increased by forcing vehicles to go around three sides of a square to accomplish a change of direction. After careful consideration of the problem and investigation of conditions in a number of cities, however, the committee is strongly of the opinion that the elimination of left-hand turns at street intersections and in the middle of the block will relieve traffic congestion. This is a measure which can be put in effect now where congestion is serious.

A criticism which can justly be made of most schemes to relieve traffic congestion is that they are too ambitious for practical purposes. More and wider streets are frequently urged as a remedy. Whether this would really improve matters or only encourage more vehicles to use the streets is problematical. Aside from that, the great defect of such a plan is that it would take years to carry it out. Immediate relief is needed. Rather than devoting their attention to plans to relieve congestion 5 years, 10 years or 50 years in the future, municipal authorities should consider what can be done now. After partial relief has been secured the future needs can be studied.

In addition to the elimination of left-hand turns several other partial remedies could be put into effect at once at small cost. By limiting parking to the left-hand side of narrow, one-way streets and forbidding vehicles to park two abreast on any street a considerable gain in useful street capacity would be had. Loading and unloading of delivery trucks could be regulated to leave the street free for moving vehicles. Some inconvenience would undoubtedly result from the enforcement of such rules. On the whole, however, it would probably be less than the inconvenience incident to the ever-recurring delays under the "do as you please" plan so generally in effect now. Certainly no intolerable hardship would be inflicted on any one.

Regulations of this kind are not a complete and permanent solution of the problem. Elimination of all parking in the congested area would be far preferable to partial elimination. Such simple remedies as

that recommended by the committee on relief of traffic congestion, however, can be put into effect without arousing antagonism. After this has been accomplished it may be possible to follow up with other more far-reaching measures. It is better to take a step in the right direction now than to hesitate simply because the ultimate goal seems a long way off.

Census Report, Just Out,

Contains Much Interesting Information

ALTHOUGH very late in appearance, the census report of electric railways for 1922, just published, will prove of great value to electric railway companies. One reason for this is that no other agency than the Census Bureau compiles such extensive data in regard to the industry. Another reason is that the census figures for 1922 are directly comparable with those for the preceding electric railway census years of 1917, 1912, 1907, 1902 and 1890. A digest of the report, including reproductions of eleven tables of special interest in the 1922 census, is contained in this issue.

In general, the figures confirm those on the status of the industry, as shown in earlier unofficial figures compiled by independent observers, including this paper. There has been no increase in electric railway trackage in the 5-year period. In fact, there has been a slight decrease, since most of the recent extensions by railway companies have been made by buses. There is also a reduction in the number of passenger cars. This may be explained by the destruction by many companies of a considerable number of obsolete cars within the last few years. A lower value of road and equipment is shown in the balance sheet for 1922 as compared with 1917. This is perhaps explainable through the reorganization of several large companies and the fact that better times have enabled the companies to put their balance sheets in better condition. Clearer evidences of a more prosperous condition are an increase in number of revenue passengers of 12.2 per cent, of railway operating revenue of 42.3 per cent, of net revenue from railway operation of 7.9 per cent, of net corporate operating revenue of 12.3 per cent, of operating income of 6 per cent and, finally, of net income of 1.3 per cent.

A study of the operating expenses in 1917 and 1922 shows that the expenses in all of the primary accounts have increased greatly, the range being from 18.7 per cent for the small item of "traffic" to 83.9 per cent for "maintenance of way and structures." The average increase in expenses during the 5-year period was 60.8 per cent. The primary expense account showing the largest increase in dollars was, of course, "conducting transportation," owing to increases in wages paid. But it is an evidence of the economical measures introduced by railway companies to note that during each half decade since 1902 there has been a constant increase in number of revenue passengers carried per car operator (car operator in this case being understood as including conductors, motorman and one-man car operators, but not elevated railway and subway guards). In the last half decade this number increased from 83,010 passengers in 1917 to 97,267 passengers in 1922. Expenses beyond the power of the railway to control have also gained in magnitude, the taxes having gone up 35.6 per cent during the last 5 years considered in the report.

Managing Director Appointed for American Association

Advisory Council Recently Formed by Executive Committee Creates New Office—Lucius S. Storrs, Selected to Fill This Important New Position, Is Widely Known in the Industry—Appointment Effective April 2

FOR some time past it has been felt that the American Electric Railway Association has not been tied in closely enough with the owners of the electric railway properties. It has been the operating men, the managers, engineers, superintendents, accountants and claim agents who have carried on the greater part of the association activities, both at conventions, in committee work, and even in the councils of the association. There have been questions of policy under discussion that are vital and of far-reaching importance. At times these have been of such a character that they could not be handled adequately by operating men. Yet the organization has not provided the opportunity for financial men and owners to take their place in the councils of the association.

This situation has been fully realized by President Shannahan and the executive committee. Complete recovery and modernization have been considered essential if the industry is to take the place it should hold among the industries of the country. This, it was felt, depended on the wholehearted backing of the owners. Accordingly, the executive committee of the association, at a meeting held on Nov. 20, 1924, passed a resolution authorizing and directing the organization of a new committee to be composed primarily of owners of the electric railway properties. This new body, termed the Advisory Council of the American Electric Railway Association, was at once appointed by President Shannahan. It consists of 23 members with B. C. Cobb, a man prominent in utility financing, as chairman. The full personnel of the committee is given on page 287 of this issue.

The council held its first meeting in New York on the evening of Feb. 3, with a large attendance. It was apparent at once that there was an opportunity to do a fine piece of constructive work. But in discussing



PRESIDENT J. N. SHANNAHAN

ways and means of procedure it soon became evident that there must be some one who could be charged with the duty of working out whatever policies were decided on. Such a man would of necessity have to speak, not alone for the advisory council nor for the association, but he actually would have to represent the industry itself.

A position such as this demands a man of the highest type—one with courage, vision, tact and industry. Representing both the owners and the operators, intimate knowledge of



LUCIUS S. STORRS

details of management, of financing, of public relations, are all essential.

The man selected for the place, Lucius S. Storrs, president of the Connecticut Company, is felt by all to be the man for the place. His choice will make available to electric railway managements and the public the services and advice of a transportation executive with wide experience. The company with which he is associated is one of the largest electric railway properties in the world. Its electric cars and buses operate practically in all parts of the State of Connecticut. That the people of that State have faith in Mr. Storrs is evidenced by their attitude. In return for square dealing, clean cars and good service, they have given his company better fares, protection against jitney competition and relief from paving charges.

During the last 6 years Mr. Storrs has devoted much time and energy to furthering the recommendations of the Federal Electric Railways Commission, which, under appointment of President Wilson, investigated all angles of the traction situation. Outstanding among its recommendations were frank dealing with the public, improved service and fair returns to the companies.

According to a statement made by leaders of the industry, the foremost problems now confronting it are modernization of equipment, new financing, and co-ordination of bus and electric railway service. It is maintained that best service and most reasonable fares will be provided to communities through the consolidation of all local transportation under suitable public regulation.

Mr. Storrs will retire from his position as president of the Connecticut Company, but will remain as a director. He will assume his duties on April 2, with offices in the Johns-Manville Building, Madison Avenue and 41st Street, New York City, on the floor adjacent to the new offices of the American Electric Railway Association.

Transportation Topics Considered at Midyear Meeting

Fares, Merchandising Methods, Improving the Quality of Service and the Place of the Bus Were Among the Subjects Discussed by Prominent Speakers at Washington—Attendance Was Unusually Large

ONE OF the liveliest Midyear Meetings ever held by the American Electric Railway Association took place at Washington, D. C., on Feb. 16 and 17. Transportation topics were discussed by men representing the operating companies, the manufacturers, the public and the regulatory bodies. The bus played a prominent part in the discussions. Meetings of committees of the association took up the first day, while the second day was given over to addresses by prominent speakers.

The morning session Tuesday was called to order by President Shannahan, who introduced Col. J. Franklin Bell, chairman Board of Commissioners of the District of Columbia. Colonel Bell welcomed the association to the "town meeting," stating that Washington is the nation's town, and so every one has a right to be there and enjoy its facilities.

Senator William B. McKinley, Champaign, Ill., greeted the association as a former electric railway man. Next to fire, he said, our greatest discovery is that of electricity. In a few words he sketched the growth of the electrical industry from its beginning up to the present time.

The association was welcomed also by Elliot H. Goodwin, vice-president of the United States Chamber of Commerce. He said that the Chamber of Commerce is representative of all the business interests of our country, among which is the American Electric Railway Association. He explained briefly that the new Chamber of Commerce Building in Washington is available as a contribution to the work of the various civic organizations represented in the national body.

In his presidential address Mr. Shannahan reviewed the status of the elec-

tric railway industry for the year 1924. He showed that the electric railways have improved their condition both in a material and in a financial way. He quoted figures to show that the industry had held its own during the year and that the outlook for the present year is even better. These figures were embodied in a statement given out to the daily newspapers some time ago by him and referred to at the time in *ELECTRIC RAILWAY JOURNAL*.

The formal address of the meeting was delivered by Interstate Commerce Commissioner John J. Esch. He sketched the regulation of interstate commerce as defined in the Constitution of the United States. The development of the various interstate industries of the country was shown, covering the entire history of the nation. The portion of Mr. Esch's speech dealing specifically with electric

Owen D. Young's Tribute to Mr. Storrs

I SHOULD like to join General Tripp in congratulating the president of the association and the association itself in gaining as your managing director Mr. Storrs.

As I have been thinking about it, you have an industry, but perhaps you haven't an art; you have a trade, but perhaps you haven't a science, and I take it, it will be the business of your managing director to develop the science of transportation in your field. That is to say, to collect that body of things known in order that you all may benefit. And it is the kind of thing which is always done when need arises. We suffered from typhoid fever, from diphtheria, from malaria, and finally the time came when we suffered no more from those diseases. Great heroism and suffering had been shown to avoid those plagues. People had prayed and suffered, but the plagues existed. Nothing really happened worth while



OWEN D. YOUNG

until a man whose business it was to find out about that particular difficulty sat down in his laboratory and his study and devoted his time and attention solely to that particular job, and when he did, the germ was isolated, the specific ways found, and the disease disappeared.

Now, to the extent to which you have diseases in this business, you are adopting that same

policy, and that policy will succeed. It depends only upon the capacity of your reserve worker and, fortunately, of that we have no doubt, and second, it depends upon the confidence and belief of the administrators of the properties in the man and the specific help which he proposes, and of that you are assured.

Typhoid would not have been eliminated if the physicians of the world had not confidence enough in it to inoculate. So Mr. Storrs can render you no service unless you at least try to follow the formula which he proposes. If you will do that, and give him your support, then I am sure that your difficulties will be solved—not tomorrow; you must be patient about it, but ultimately they will be solved.

And so I congratulate you on this step forward. And difficult as the job is, I congratulate Mr. Storrs upon the opportunity which its very difficulties present.

railways is abstracted elsewhere in this issue.

A spirited talk in characteristic style was given by Peter Witt, traffic consultant and formerly street railway commissioner of Cleveland. Mr. Witt recited many of his experiences in the street railway business, some of which indicated opportunities for great improvement. Mr. Witt's address is abstracted elsewhere in this issue.

Following Mr. Witt's address the meeting adjourned to the south lawn of the White House, where a picture was taken with President Coolidge.

Afternoon Session

At the afternoon session, J. G. Barry, vice-president General Electric Company, read a paper outlining the views of the manufacturer relative to the electric railway industry, with particular reference to the view of the electrical manufacturer. This is abstracted elsewhere.

A rising vote of thanks was extended to Mr. Witt and Mr. Barry for their contribution to the program on motion of C. E. Morgan, vice-president and general manager Brooklyn City Railroad. Commenting on Mr. Witt's talk, M. B. Lambert, manager railway department Westinghouse Electric & Manufacturing Company, said that in paying deserved tribute to Mr. Birney for his work in developing the safety car Mr. Witt had failed to give credit to himself for the car which has been called by his name. Mr. Lambert also said that credit was also due to P. N. Jones, late general manager Pittsburgh Railways, for the development of the low-floor car. Development of a small number of standard trolley car designs with standardized equipment was advocated as a means of improving conditions in the railway industry.

Referring to the talk of Mr. Witt, Mr. Morgan called attention to the importance of having electric railway executives ride in their own cars. From his own experience, he said, great benefit is derived by the railway manager from this first-hand contact with employees and customers. An opportunity is available for individual contact with the men in charge of the car and valuable suggestions may frequently be obtained by contact with the passengers.

Miss Helen Sterner of Lorain, Ohio, discussed the subject of electric railway service from the standpoint of the feminine passenger and entered a plea for consideration of the woman's viewpoint in judging the character of service being rendered to the public.

Continuing with this topic of improving service, C. D. Emmons, president United Railways & Electric Company, Baltimore, Md., discussed briefly the work of the service department in his company. Its primary object, he said, was to get the viewpoint of the car rider. After getting this viewpoint, and in adopting steps to improve service, promptness in applying a remedy is considered one of the most important factors. "Do it now" is the motto of this department. Mr. Emmons added that so far as service department work is concerned this motto is based on the thought that things promptly done are twice done. On the subject of standardization, he said that improvements



PRESIDENT COOLIDGE GREETES THE LEADERS OF THE INDUSTRY AT THE MIDYEAR MEETING

in the apparatus used on cars were one factor responsible for the large number of types developed, and that lack of standardization is largely attributable to this cause.

Speaking from the car rider's viewpoint, Walter Drey, vice-president and general manager *Forbes Magazine*, said that many small incidents and conditions may affect the car rider's impression of electric railway service. He mentioned the matter of illumination in cars as a subject that was worthy of serious study. Contact between trainmen and the public is particularly difficult, according to Mr. Drey, because it is a group contact rather than that of individuals. Situations which might readily be handled between individuals become productive of irritation and bad feeling when the contact is with larger groups. He advocated study of crowd psychology as a means of determining methods of improving public relations of the industry.

W. H. Sawyer, president East St. Louis & Suburban Railway, called attention to the attendance at the meeting and compared this with the conditions regarding previous electric railway conventions attended by Mr. Witt. Mr. Sawyer called this another day, and he referred to the audience as a 1925 group of electric railway operators. He also recorded the fact that it was a representative of the public, in the person of Mr. Witt, who during the morning session had advocated zone fares and who had criticized public service commission regulation of electric railways.

President Shannahan prefaced his introduction of the newly elected managing director of the American Electric Railway Association by saying that the need for this step had been developed from a realization of the lack of a direct tie between the owners of electric railway properties and the activities of the association, which are carried on primarily by the managements of these properties rather than by their owners. In handling situations of national importance, he said, there is a limit be-

yond which the operator or manager cannot go. In the administration of the National Electric Light Association he pointed out that a policy committee had been formed to overcome just this situation. The advisory council of the American Gas Association performs the same function. The American Electric Railway Association executive committee had therefore decided to take a leaf from the experience of these other associations and had formed an advisory council which consists of the following members: B. C. Cobb, Owen D. Young, Guy E. Tripp, Samuel Insull, Randall Morgan, L. S. Storrs, H. G. Bradlee, Nicholas F. Brady, Britton I. Budd, F. R. Coates, Samuel M. Curwen, Frank L. Dame, Henry L. Doherty, C. D. Emmons, P. H. Gadsden, Thomas N. McCarter, S. Z. Mitchell, J. H. Pardee, H. Hobart Porter, Paul Shoup, R. P. Stevens, A. W. Thompson, and J. N. Shannahan, president American Electric Railway Association, ex officio.

At the initial meeting of this council, held in New York City on Feb. 3, 16 members were present. It was apparent at this meeting that an opportunity existed for doing widespread constructive work in improving the situation of the electric railways. It was also apparent that this work must be put in the hands of some one individual to direct and co-ordinate. Mr. Shannahan announced that Lucius S. Storrs, president the Connecticut Company, had been elected to this newly created position, with the title of managing director of the American Electric Railway Association. Mr. Shannahan went on to say that this new activity will give the industry an opportunity for taking up nationally the problems affecting its interests just as soon as it becomes evident that such questions are of national significance. He said that the advisory council has agreed to underwrite the cost of this work until it could be distributed among the individual companies who are to receive its benefits. Steps will therefore be taken to distribute the expense resulting from this new activity.

At the conclusion of President Shannahan's remarks, Mr. Lambert said that the association and the industry owed its president an expression of appreciation for his initiative and action which had resulted in the formation of the advisory council and in the election of a managing director of the association.

MOTOR BUSES DISCUSSED

A paper on motor buses from the electric railway viewpoint was read by H. A. Mullet, assistant general manager the Milwaukee Electric Railway & Light Company in the absence of the author, S. B. Way, vice-president and general manager of the same company. Mr. Way's paper appears elsewhere. At the conclusion of the paper Mr. Mullet answered a number of questions relative to the operation of buses in Milwaukee. He described the conditions under which seven-passenger sedan automobiles are run in competition with the electric railway company's service, and the system of fare collection used on buses of the railway company. He said that in interurban service the buses had shown earnings which paid the entire cost of operation and depreciation, together with a slight return on the invested capital.

The motor bus was considered from the motor vehicle viewpoint in a paper by T. R. Dahl, secretary the White Company, representing the National Automobile Chamber of Commerce. This paper appears elsewhere.

Following the presentation of the paper, President Shannahan commended Mr. Dahl on his extremely fair view of the relation between the automobile and the electric railway industries and said that the association and the electric railway industry owed Mr. Dahl a vote of thanks for his able presentation of this subject.

Then followed a consideration of the need for co-operative treatment of the transportation requirements in a city, and a spirited discussion ensued on the relations which should exist between an electric railway company and an independent bus company operating on the same streets. The principal speakers were Col. A. T. Perkins, manager for the receiver United Railways Company of St. Louis, and T. S. Wheelwright, president Virginia Railway & Power Company, Richmond, Va. At its conclusion President Shannahan declared it to be the policy of the association to stand for fair tactics between rival transportation systems.

J. C. Thirlwall, General Electric Company, discussed the development of the electric bus drive recently perfected by his company. He said that in general the trend today is toward bigger and bigger buses, both of the single-deck and double-deck type. The bigger vehicle has compelled the use of a bigger power plant. The six-cylinder engine of greater horsepower is being generally adopted. Using the mechanical drive that has been a standard part of automotive equipment on these larger vehicles with their larger power plants has developed difficulties that were never apparent in the pleasure car or in the smaller and earlier forms of the bus. It is almost amazing to the average railroad man who takes up bus

AT THE MEETING of the executive committee of the American Electric Railway Association held in Washington Feb. 16 the following statement of principles regarding the motor bus was unanimously adopted:

Principles Regarding the Motor Bus

Recognizing that there is a place for the bus in local transportation, the executive committee of the American Electric Railway Association subscribes itself to these convictions:

1. No medium has yet been developed which alone can take the place of the electric railway in moving large numbers of persons during morning and evening rush hours in cities. There is a place for the bus in transportation as an auxiliary or supplement to and, in some instances, substitute for electric lines.

2. Electric railways are in the business of providing transportation in their respective communities. It is their duty to supply all local transportation, both by electric railways and buses, essential to good public service. When supplying such service by rail cars, buses, or both, they should be protected against competition in the operation of all such lines.

3. Buses should be regulated by law as common carriers and the effort to make bus regulation uniform throughout the United States continued and encouraged.

4. Both buses and electric railways should bear proportionate taxes and other public obligations fairly chargeable to them as public carriers.

operation for the first time, the terrific maintenance cost and the comparatively brief life of the driving mechanism when he compares it with his rail car expense. In analyzing the cost of maintenance, it is found that the mechanical drive itself is largely responsible in the hands of the average operator. The gear shift and clutch, handled by the ordinary driver, is a weapon of mechanical assault and battery on the engine itself, on the clutch, on the gearing and on the axle and tires.

It was to minimize the terrific shocks and strains that are inherent in the mechanical drive that the gas-electric drive for buses was recently developed and perfected.

Electric drive simply means taking out the gear box, the transmission gearing and the clutch, and in some instances taking out the differential drive and substituting for it a dual drive, removing parts that are inherently short-lived and high maintenance parts and replacing them with an electric generator, directly connected to the engine and with a motor or motors of the ordinary railway type.

By actual tests, he said, it has been found that in city service the engine revolutions per mile are reduced from 15 to 21 per cent; that the maximum engine speeds are reduced approximately 40 per cent; that the inspection of the engine, which many of the larger companies put on a 2,000-mile basis, can be stretched out to 4,000, 5,000 or 6,000 miles, which in itself saves materially in cost, and that, better than that, the electric equipment permits of an almost instantaneous test of the efficiency of the engine by

connecting the generator to a water rheostat and taking ammeter readings at a given engine speed. That permits in a few minutes an exact determination of the condition of the engine which can only be had at the present time by taking the engine off the car and settling it up on a stand dynamometer test, which is a long and extremely expensive performance.

A bigger thing than maintenance, however, is the fact that it was found by an extensive series of tests that a higher schedule of speed could be maintained with the electric drive without abuse to the equipment or without discomfort to passengers than is possible with the mechanical drive, and as railway men I think we all realize that high schedules are not only the greatest economy that can be effected in railway operation, but they are also one of the best means of selling transportation. In answer to a question he said that he believed it possible ultimately to develop this type of drive so there would be little if any increased weight in the mechanical construction.

A resolution proposed by C. D. Emmons was passed expressing the thanks and the appreciation of the association to the speakers and various organizations which had co-operated to make the meeting a success, particularly the Chamber of Commerce, the management of the New Willard Hotel, the committees of the association on transportation, subjects and meetings, and dinner arrangements. Thanks to the local railway companies and to J. H. Hanna, vice-president in charge of operations Capital Traction Company, were also included in the resolution.

President Shannahan announced that the annual convention of the association would be held in Atlantic City during the week beginning Oct. 5, after which the meeting adjourned.

The last event on the program of the meeting was a banquet in the ballroom of the New Willard Hotel. More than 700 diners were present to enjoy one of the best sessions of the entire convention.

During the dinner the guests were entertained by a number of vocal selections. Much amusement was occasioned by the distribution of a four-page leaflet, "One Bell," made up to resemble a newspaper. The publication of this sheet was arranged by Robert Dougan, publicity agent Capital Traction Company, and printed with the assistance of the Washington Times.

After the dinner the guests listened to three speakers who discussed topics of interest to the electric railway industry. The speakers were G. F. Hamilton, president Capital Traction Company; Gen. Guy E. Tripp, chairman board of directors Westinghouse Electric & Manufacturing Company, and Matthew C. Brush, president American International Corporation. By special request of Mr. Brush, Owen D. Young, chairman of the board General Electric Company, spoke a few words of congratulation to the association and to Mr. Storrs concerning his appointment as managing director. These remarks appear verbatim elsewhere. At the conclusion of the speeches there was informal dancing.

The Car Rider's Viewpoint*

By Peter Witt

Street Railway Consultant, Cleveland, Ohio

Observations on Railway Operating Methods in Nineteen Cities—Better Transportation Is Demanded Rather than Cheaper Transportation—Larger Field for Railway Service Pointed Out

I HAVE been in 19 cities and I have ridden cars until I was sore but satisfied. I have seen many things that the owners of transportation companies have never seen; and my advice to you is—get acquainted with your own product and you will be able to appreciate the feelings of the people that you are doing business with.

Most of the people who are engaged in transportation seem to look upon their customers as enemies. It is the most remarkable business that you can imagine, where every owner thinks that every fellow who gives him a nickel is his enemy. You sort of have an attitude toward him like a merchant would have if he put a bulldog in front of his store after he spent money in advertising a cheap product. It doesn't work that way.

Take your engineers and your master mechanics and general managers and send them around the country and let them see what other properties are doing. Don't go there announced, to be entertained by the other fellow, but go there as a stranger, because it is my observation, of course, that we do make progress, and you then will see the many things that I have seen in the 19 cities that I have been doing car riding in, and you will have many a good laugh.

Of course, the common thing that I meet in most places is that very few transportation people keep their track in good condition. It seems to be the universal rule that when a joint commences to show a break and the equipment starts to hit it, you don't send the man out to repair it, but you wait until the joint is gone and the rail on the opposite side is cupped. And after the equipment has pounded itself to pieces for 2 years, you go out and put in a new piece of equipment. That isn't the way a car rider ought to be treated.

You will become informed of many things if you will send your men around the country, so that they may observe how things are being done and come home and tell you, so that you may profit by it. In every town something is done better, and some things are done worse than in any other town; all you have to do is to pick up the good things and bring them home in a collection and then you will have all the good things for your own town.

I have ridden in street cars where I found transfers three weeks old. I have seen conductors punch transfers with a nail. I remember one city I got into, where I was waiting for the car to start. All of a sudden a fellow came along and I looked at him and I



PETER WITT

thought he was a curve greaser. He had on a pair of overalls—not even made of the checked stuff, but made of the plain blue. I looked at him and thought, "This fellow is riding the car with his grease bucket; I wonder if he keeps the grease off of the passengers." But I was mistaken; that wasn't the fellow who greased the curves, it was the conductor himself.

Now, you wouldn't like, if you were riding the street car, to have a fellow in the uniform of a curve greaser come up to collect the fare, would you? Well, the chances are that that corporation in that particular city, through the individuals in control, did not like it, but the officers never rode a car, they didn't know the way the conductor was dressed.

In that same city I saw a thing that amused me very much. I noticed that the trail pullers running around in the daytime had a night shirt on them; they were dressed in a night shirt made out of canvas. Well, I never had seen a coupler incased in a canvas bag, and I said to one of the men operating the property, "What's the idea of putting canvas over the couplers?"

"Why," he said, "that will keep the dust off of them."

Now, that sounds funny to you, but I saw it with my own eyes, and saw the man take it off and then put it on. Imagine a railway spending good money in buying canvas bags to put over couplers to keep the dust off of them.

Can you wonder that sometimes the car-riding public doesn't take kindly to the trials and tribulations that you go through, when they see such nonsensical performances? That is patent, you know, when you go out if you merely observe those things. You can't observe them if you stay home; you can't get next to them if you go down to Young's Pier at Atlantic City, but if you travel all over the country you will become acquainted with them.

I have been in cities where the cars have a horrible appearance and are rusty for lack of paint. The operators are careful about having the carhouses, where the cars remain for 6 hours at night, nicely painted, but they will allow the cars, which are out on the street for 18 hours a day, go without any paint. Remember that it is just as important, if not more so, to keep the cars painted as it is to see that the carhouses are in good condition and painted.

To me, there was only one man in the United States who really ever understood the question of transportation, and that was George Pullman. When he conceived that wonderful thing that we now enjoy, known as a sleeping car, and took it to New York to peddle it, he was buffeted from one sidewalk to the other, and he was confronted with the statement by the people who had money that it wouldn't do, and that it would increase the cost of transportation. And to that, George Pullman had just one reply, and that one reply was that the people did not want cheap transportation, they wanted better transportation!

You can't make transportation too good. The better you make it the more car riders you will see, and the worse you make it the fewer car riders you will sell. Now, you have got to understand that you are merchants, that you are selling something that people must have, and that people are eager to buy if you will merely deliver the stuff that they want.

You are disturbed about the automobile. Now, I am not disturbed about the automobile. I think the privately owned automobile has been a boon to this industry. The private automobile, to the extent that it brings people down in the morning and takes them home in the evening, during the rush hours, is a benefit to you because it relieves you of part of the peak which is the unprofitable end of your business. Of course, at one time it was believed that that was the profitable end. You know, they used to write franchises which stipulated that people should be carried for so much a ride, but when the hour of heaviest peak came, then the charge was reduced, when it cost most. Now the privately owned machine is not hurting you, and when you realize in your cities that every fourth or fifth person is the owner of a machine, don't get into the frame of mind of thinking that he is going to hurt you, because he is not. And when you see 20,000 and 30,000 and 40,000 machines on the highway going this way and that, don't figure that is a loss to your business, because it is not. Don't assume for a moment that when a man has taken a pleasure ride in the car that he would be on the street car if he wasn't in the automobile, because he wouldn't.

The automobile has merely made it possible for people to take more rides that they wouldn't take if they had to use a street car. It is not a loss of business to you. Then, of course, after that comes the bus, which now is agitating this industry. I don't know what the bus can do, and neither do you. It is something new, and there isn't anything yet by which we can gauge it. All that we can say about it

*Abstract of a paper presented at the Midyear Meeting of the American Electric Railway Association, Washington, D. C., Feb. 17, 1925.

is that the bus is an economic factor and that if you can transport people on rubber tires for less than you can move them on steel wheels on steel rails, the bus will supplant the street car, and nothing can prevent it.

However, I don't think that time ever will come. I know that there isn't anything in this world that is so frictionless as a street car, a steel wheel on a steel rail. I know that there are car bodies in this country that have been on wheels for 35 years. I know that no bus body will remain on wheels for 35 years, even if you carry three mechanics on every trip. I know that there are motors operating on trucks and under street cars in this country that have been obsolete for 20 years, but they are still turning around.

And I know that there isn't an internal combustion engine made, or that ever will be made, that will run 35 years!

I know that I can take a pinch-bar and move a gondola with 80,000 lb. of coal; that tells me that there isn't anything as cheap as steel to steel. So I don't subscribe to the theory that seems now to be running rampant among this fraternity, that the day of the street car has passed and the day of the automobile is here, because it is not. The automobile or the bus can be used, of course. There is a place for it as well as for the street car, but it will never supplant the street car in the cities of this country, and it shouldn't, and it won't, unless it can do it cheaper—and only time will be able to demonstrate that to us.

so that the carriers were enabled to raise the intrastate rates to the level of the interstate—and like relief may be granted in other cases where a like situation is presented.

Street and interurban electric lines have been suffering under two handicaps—the nickel and the jitney. The 5-cent fare was originally a part of your charter or your contract rights. Being incorporated in a charter or in a contract made with the Council, it was considered as immutable as the law of the Medes and the Persians, and for a long time, notwithstanding your presentation of increased costs of labor and materials, the 5-cent fare remained a constant.

You ought to increase the fare—and I have noticed in the address made by your president that the average fare now has attained something in excess of 7 cents. The nickel was considered as a sacred number, but I take it that 7 is more sacred because you will find it justified in Holy Writ.

Jitney competition, which was so severe a few years ago, is in a way resolving itself because you are laying your cards upon the table before common councils, your patronizing public, and the regulatory bodies; you are meeting them across the table, and to the degree in which you manifest frankness in every detail can you expect relief.

I am glad to note that the situation of electric lines is better than it has been in prior years; far better than it was during the war, during 1919, during 1920, during 1921, and even a part of 1922. Reading your proceedings in 1921, I noticed there was a tone of pessimism throughout the addresses and there was also in the statistics offered; but I think you have seen that the sun is shining through a gap in the range and that the slough of your despondency is now being brightened by the full sunlight. At least, I sincerely hope that that is being realized.

It would be my suggestion that you continue your plan of advertising what you have to sell, of taking the public into your confidence, of increasing your public relations to a point where there be mutual confidence between yourselves, the patronizing public, and the regulatory bodies. By doing that, there will be a better feeling between yourself and your employees. You have a right to tell the patronizing public that they owe you something; you have a right to tell them that by reason of these electric lines it has been made possible to relieve the congestion of the great cities and to give the man of moderate means a chance of buying a home out in the open spaces where he can raise his family at a reasonable cost. You have a right to tell the manufacturer and the merchant that because of your lines and your facilities you are bringing customers to their very doors. These are legitimate methods of advertising, and you have the full right of going to the uttermost limit in presenting your views to this public.

You have a right also to try to secure ownership in your securities, on the part of your employees and the patronizing public. Have you noticed the result of an experiment tried by

Transportation Acts and the Electric Railways

By John J. Esch

Member Interstate Commerce Commission

Despite Original Franchise Provision a Fare Higher than 5 Cents Is Now Deserved—Legitimate Advertising Will Improve Public Relations—Stock Ownership by Employees and the Public Gives Them a Stake in the Success of the Property

WITH reference to the immediate interests of the electric railway industry I might say that the original interstate commerce act in defining a common carrier declared that it was engaged in the transportation of persons or property by railroad. There is no distinction made in Section 1 of the original interstate commerce act as between the steam and the electric line, and ever since Frank Sprague of New York developed the practical trolley at Richmond, in 1888, electric interurban lines engaged in interstate commerce have been subject to the jurisdiction of the Interstate Commerce Commission. In numerous cases we have passed upon your rates and fares and charges, and they have gone to the Supreme Court and the jurisdiction of the commission has been sustained.

In the transportation act of 1920 there has been an exception made with reference to street, urban or interurban and electric lines which are not a part of a general system of steam railroad transportation. I remember distinctly that your people were not of one mind as to the scope of the proposed legislation. There were some of you who believed that you should come under the full provisions; others were opposed to such a proposition. Some were willing to come under title 3, the labor provisions; others were opposed thereto. With this contrariety of views, the committees of Congress formulated the



JOHN J. ESCH

transportation act as it is today. Each individual case, therefore, will have to be determined upon its own merits.

On Jan. 5 the Supreme Court of the United States handed down a very interesting decision with reference to two Ohio traction companies. The city of Wellsville and the village of Hebron brought action. The interurban lines supplying this city and this village also connected with cities in Pennsylvania and in West Virginia, thus making them interstate common carriers. The common carrier had an interstate level of rates. The intrastate rates were lower. It sought to have the intrastate level of rates raised to the level of the interstate. The commission granted the relief. This city and the village took the case to the Supreme Court, and that court affirmed the decision of the Interstate Commerce Commission,

*Abstract of a portion of a paper presented at the Midyear Meeting of the American Electric Railway Association, Washington, D. C., Feb. 17, 1925.

the New York Central last week? It put out 35,000 shares of its stock, par value \$100; first chance of purchase by employees. There were over 42,000 applicants for the stock. The company doubled the amount of the stock that could be subscribed, and the company today has 42,000 more stockholders

than it had two weeks ago, and it has disposed of \$6,800,000 in stock at par. What is the significance of that? It means that 42,000, practically one-fourth of the employees of the New York Central System, now have a financial stake in the success of that great railroad.

One Railway's Experience with Buses*

By S. B. Way

Vice-President and General Manager
Milwaukee Electric Railway & Light Company

Where, When and How They Should Be Employed — The Results Obtained by This Company Show that It Is Essential to Use the Best of Equipment and to Be First to Render the Service—Principles Found to Be Successful Are Enumerated

THE answer to the question "When, where and how should motor buses be used by electric railways?" can, from the experience of at least some of us, be compressed into a few words, namely: Anticipate demands and opportunities for bus service; be first to render such service; employ only the best equipment and personnel. Analysis of a particular situation will illustrate the point.

Take the case of an electric railway system operating something like 230 miles of city track and 260 miles of track in suburban and interurban service. The city tracks are practically all in paved streets. The suburban and interurban lines are largely on private right-of-way. This railway system serves a total population of about 800,000. The interurban cars reach the centers of the principal cities over tracks used also for local street railway service. The suburban and interurban lines are in every instance directly or closely paralleled by concrete or other hard-surfaced roads, and the area between these lines is in practically all instances further supplemented by similar hard surface roads. These hard surface roads extend to practically all towns within a radius of 100 miles or more from the principal center from which this railway is operated.

NO RESTRICTIONS IN STATE LAWS

The state law is such that any one can go into the bus business either in the city or in the country, or both, upon the mere filing with the Public Utility Commission of a statement of the general route over which such buses are to operate, a proposed general schedule of hours during which service will be rendered and a general statement of the rates of fare to be charged. This statement must be accompanied



S. B. WAY

by an indemnity bond for the payment of damage claims up to the amount of \$2,500 for any one individual and \$5,000 for any one accident.

The Public Utility Commission has substantially no discretion in the matter of approving such applications where accompanied by indemnity bonds. The law especially provides that the fact that the route parallels a street railway system shall not be taken into consideration by the commission in passing upon the adequacy of the application or the bond. After the commission has once discharged its rather perfunctory duty it loses jurisdiction unless notice is given by the bonding company of the cancellation of the bond, whereupon the commission is required to cancel its certificate. The commission has no means whatever of ascertaining whether or not the carrier observes his proposed route or operating schedule or even adheres to his filed rates of fare.

Under the law, cities and towns may require the payment of license fees by buses or so-called bonded carriers, which license fees, however, are limited to amounts reasonably to compensate the cities or towns for wear and tear

on streets and bridges and for the cost of regulating traffic. The cities and towns are not permitted to levy a franchise tax as such. The only taxes assessed against such carriers are the taxes applicable to any business and property, the federal bus tax and the state auto license fee.

The only regulation of the service is that imposed by local sheriffs or police in respect to observance of rules of the road, speed ordinances and the like. The meager protection of the public against the operation of more or less irresponsible buses or common jitneys embodied in the requirement of the filing of bond, as described, was enacted only after one city in this state became infested with as many as 1,500 jitneys at one time and where the jitneys in some of the smaller cities practically ruined the street railway business. The cost of insurance coupled with the war activity, higher cost of automobiles and their operation, and the general and substantial advance in wages operated practically to eliminate the old fashioned 5-cent jitney or even the converted touring car operating at a 10-cent-fare.

In this situation and subsequent to the enactment of the bonded carrier or so-called jitney law, buses first made their appearance as a medium for extending interurban railway service to points beyond rail heads. These buses were first operated by individuals but were shortly taken over by the railway and operated in its own name. The small patronage enjoyed by these buses, the low earnings and the comparatively high expenses per bus-mile gave the railway officials the impression that buses were not likely to become extremely popular. These initial operations, however, were undertaken over gravel surfaced highways and with bus equipment not in any way comparable to later equipment in respect to comfort or attractiveness to passengers.

As soon as the first 36-mile stretch of concrete road paralleling one of the interurban railway lines was completed, a fleet of, at that time, relatively high-class buses was imported from a bus operating organization which had achieved a considerable measure of success in its operations between neighboring cities in a near-by state. These buses were operated by experienced bus men and the organization appeared to have a considerable measure of responsibility. As additional roads were completed, paralleling the interurban lines, these people experimented with different routes until they located their equipment on routes which would yield the largest revenues per bus-mile. It early became apparent that buses of this character operating on concrete or other hard, smooth-surfaced roads were taking away an appreciable amount of traffic from the railway.

COMPETITION COULD NOT BE IGNORED

The railway management early concluded that it could not afford to ignore the possibilities of such bus operation, particularly under these circumstances of total lack of protection by state laws or municipal ordinances, its obligation to operate regularly and safely at fixed rates of fare and the charac-

*Abstract of a paper presented at the Midyear Meeting of the American Electric Railway Association, Washington, D. C., Feb. 17, 1925.

teristic tendency of the public to prefer travel on rubber and soft leather cushions in modern vehicles. The situation was squarely put up as to whether the electric railway should lie down and take a good licking, or whether it should stand up and make an effort to remain the predominant factor in organized transportation service in the district served.

It was quickly recognized that it was impracticable to attempt to retain the business for the electric railway by attempting to compete with modern high-class buses operating on close headway with 15 and 20-year-old railway cars, well maintained to be sure, but nevertheless lacking much in the way of novelty and attractiveness of interior finish that was offered by the buses. It was believed that unrestricted, unregulated and uncorrelated free-for-all bus service, on magnificent hard-surfaced roads and operating substantially tax free, could result in but one thing—the destruction of the railway and the complete disintegration of organized and responsible transportation service.

MEETING COMPETITION WITH BUSES

There appeared to be but one course left open to the railway management, namely, that of meeting bus competition with buses. The railway proceeded according to its best judgment, procured buses which it believed were best adapted to meet the situation which confronted it and launched into the bus business. It started out with an announced policy of recognizing that a change in transportation methods had occurred, and that it was prepared and proposed to give the public the best transportation service of whatever character the public wanted and at the lowest consistent cost. The railway made numerous grievous errors in the initial selection of its equipment and rapidly awoke to the fact that time-honored ideas and prejudices of electric railway men could not be successfully grafted onto the bus business.

Bus companies multiplied in the district and the railway company was kept extremely busy keeping up not only with the rapid development of bus lines as fast as new highways were completed and opened, but also in keeping up with the rapidly changing styles in buses. Each new competing bus organization brought out a type of bus which it believed would be most attractive to the public and which would gain for it the lion's share of the patronage. The railway company utilized its inherent advantages of established credit and superior purchasing power and its experience in respect to standardized methods and training of personnel, all with the result that it rapidly acquired fleets of different types of buses, each carefully selected with respect to the particular class of service to be rendered. In each case the equipment was made the most attractive that could be devised with reasonable regard for practicability in operation.

This policy began to tell, and within a year from the time competition was first encountered in parallel bus operation, the first competing organization sued for peace and sold its equipment to the railway on the basis of the de-

preciated value of the equipment and with no allowance for going value, good will or the like. Numerous other competing organizations operating buses of various types have found the railway competition too severe, not from the standpoint of cutting rates, but from the standpoint of absolutely reliable, courteous and safe service in vehicles of the highest possible standard, with the result that they have one after another likewise sued for peace. The refusal of the railway to pay tribute to get rid of troublesome competition has, it is believed, deterred many bus men from entering the field.

MAKING BUS SERVICE PAY ITS COST

In the meantime the railway has been able to operate its interurban bus service on a basis of recovering the full cost of operation, including depreciation, and with a substantial contribution toward a full reasonable return. It has not been able entirely to eliminate destructive competition as yet.

The latest development in such competition has been the utilization of high-class seven-passenger sedan cars, on which license fees and taxes are very light, which operate at extremely high speed and which offer the public carriage in what amounts to a private limousine. Careful study of this type of competition reveals the surprising fact that such buses can exist on revenues as low as 12 to 14 cents per bus-mile. This surprisingly low cost of operation is accounted for by the fact that buses of this type are quickly loaded and the loading is accomplished with few stops. When the buses are once loaded, they run practically without stops and at high speed from one terminal to the other. The high speed reduces the element of driver's wages per bus-mile and does not materially increase maintenance or other operating costs per bus-mile. Such cars are available at less than \$2,000 each, and even in relatively hard service can be operated so as to keep the factor of depreciation down to about 1 cent per bus-mile.

Experience is demonstrating that this character of competition can hardly be successfully met by any of the conventional types of 15 to 30-passenger machines, and that where such competition exists the railway or other organized and responsible transportation agency must employ its purchasing power, operating organization and its best experience to meet the demands of the public in developing a high-speed small car service which the public will prefer to that offered by competitors.

While this intensive development was going on in the railway company's interurban and suburban territory, the operators of a bus line in another city connecting depots with a department store conceived the idea of procuring a so-called franchise for the operation of buses paralleling certain of the company's best city railway lines. Notwithstanding the law was fairly clear to the effect that cities could not give any franchise for the operation of buses, but could impose on bonded carriers procuring certificates from the public utility commission reasonable license fees to compensate for wear

and tear on streets and bridges and for the cost of regulating traffic, these parties caused to be introduced into the city council an ordinance authorizing the exclusive operation of a line of buses and proposing to pay the city a license fee of \$100 per bus. Prior to the filing of this application for a so-called franchise the railway company had anticipated that some one was likely to begin the operation of buses paralleling its best street railway lines. Demonstrated popularity of the interurban buses could lead to no other conclusion.

Considerably in advance of any talk whatever of the inauguration of local city bus service, the company accordingly placed an order for what were at that time the highest types of single and double-deck buses available in this country. In advance of the actual receipt of these buses, the company had filed its application with the public service commission for the necessary bonded carriers' certificates. Upon filing the application by these outside parties for the so-called franchise in the city, the company, with the cooperation of the manufacturer in hastening deliveries, immediately inaugurated service. Through a period of a year and a half the railway company continued and constantly improved its local operation in spite of many attempts to harass it.

EXTENDING CITY RAIL LINES

In the meantime, the company had not overlooked the places in its city transportation system where service was required but where the volume of traffic could not by any stretch of the imagination begin to justify the heavy initial outlay required for the construction of tracks, paving and other accessories of a street railway. These lines were generally in the outskirts and the locations were not in any way attractive to independent bus operators. In these situations, the company installed high-class bus service at railway rates of fare and exchanged transfers with the cars. These local city bus lines were at first operated at a net loss represented by the total cost of operating the buses, because in the beginning they did not produce any appreciable increased riding over what would have come to the railway without the buses. However, by keeping the bus equipment strictly high class and operating on regular schedules, good weather and bad, and practically independent of the quantity of snow, the public began to increase its patronage to the point that these lines can as a whole now be said to be at least entirely self-supporting in respect to the full cost of bus operation, exclusive of return. The surplus over and above this expense is making some appreciable contribution toward return. The main return from these buses, however, is in the improved position which the company occupies in the community, which is reflected by better patronage of its transportation system as a whole than would have been the case otherwise, and in the final conclusion of the city itself that it could not afford to invite outside bus operators to jeopardize the highly organized and complete local system of transportation.

In attempting to fulfill its mission of rendering a complete and properly correlated railway and bus transportation system, this railway has found it necessary and expedient to operate something over 750 miles of interurban bus route and close to 50 miles of city bus route. The operation of these several bus services requires 132 buses of all types. The number is yearly increasing.

PRINCIPLES FOUND SUCCESSFUL

The experience here briefly sketched has led the management to the following conclusions:

That the time to operate buses is before the other fellow gets the jump on the job.

That the place is wherever buses can render a useful service on a self-sustaining basis, whether necessarily correlated with the railway system or not.

That bus service should be inaugurated wherever the so-called independent operators attempt to horn in on the railway company's transportation business without being willing to assume all of the responsibilities and burdens which the railway organization must assume and carry.

That to render satisfactory and profitable service to the railways the buses must be of at least as high class as individual or so-called independent operators could or would procure.

That buses must be operated by a carefully trained and especially selected and supervised personnel.

This experience has also taught that where the buses are operated as a part of the railway system, i.e., at railway rates of fare and exchanging transfers with the railway, it is desirable that the buses be operated under the supervision of the railway transportation department; that they be painted the car colors, that the men wear the railway uniforms and that everything else possible be done to identify closely the bus with the railway system.

Where, however, the buses are operated as a competing or auxiliary service rather than as a part of the railway, it is desirable to paint equipment distinctive colors and even to distinguish special classes of equipment by different colors, as, for instance, parlor cars from regular cars. Such operation cannot well be handled by the regular railway supervisory force, and best results are secured from the organization of a bus transportation department in charge of a superintendent carefully selected for his adaptability to this service.

ENGAGEMENT OF OPERATORS

The value of special care in the selection and training of bus operators cannot be overstressed. It is interesting to observe that it is possible, through the observance of such a plan, to operate buses over a period of several years and many hundred thousand miles of service, with lower average costs for injuries and damages expressed as a per cent of operating revenue than are experienced in the same situation in a railway, where the same care is used in the selection and training of railway platform men and otherwise in promoting safe and satisfactory railway service.

Manufacturer's Contribution to the Electric Railway*

By John G. Barry

Vice-President General Electric Company

Many Technical Gains in Last Few Years Have Added to Earning Power of the Railways—Means by Which Operating Companies Can Help the Manufacturer Are Standardization, Anticipation of Requirements and Correct Shipping Dates



JOHN G. BARRY

IN A recent message to our stockholders the president of the General Electric Company said, in effect, that the problem of a manufacturing corporation is threefold, and that its accomplishments must be measured from three points of view: (1) Service to the public; (2) to the employees, and (3) to the stockholders. The first consideration is "service to the public," and it seems to me that if we render efficient service to the public, both employees and stockholders will benefit. We feel that the manufacturers have rendered valuable service to railway companies, and while it has not been all that we would like it to be or that we hope to make it, nevertheless it has been of distinct benefit. From an engineering viewpoint manufacturers are prepared to have their engineers study your problems. In the manufacturing end we endeavor to carry stocks of the more popular types and sizes of apparatus and so to equip our plants that reasonably early shipments can be offered on apparatus not carried in stock.

In addition, electrical engineers have made contributions, such as the introduction of the automatically controlled substation and the light-weight motor and control equipment for light-weight cars, which have improved the service to the public and reduced the expenses and increased the revenues of operating companies.

There has been marked improvement accomplished in the design and efficiency of generating apparatus. I quote from a statement issued Jan. 15 to

stockholders of the General Electric Company:

Twenty years ago the efficiency of conversion of the energy of coal to electricity was a little over 10 per cent. Since that time the efficiency of the turbo-generator has been greatly improved, much larger units have been introduced, higher degrees of steam pressure and superheat with better auxiliary conditions have been adopted, so that we now realize an efficiency of conversion of approximately 19 per cent, an increase of about 90 per cent. We now seek to gain a kilowatt of energy from a pound of good steaming coal, which means an efficiency of 24½ per cent in the conversion of coal to electric power. Looking forward to the introduction of the mercury boiler and turbine, it is expected that these will further increase the efficiency of this conversion to 33 per cent, or more than three times as much as 20 years ago. What this means to the public as a whole, may be gathered from the following. In 1919 the average of the electric central stations throughout the United States was 3.2 lb. of coal to produce a kilowatt of energy. In 1923 the efficiency of the turbines and other apparatus in use in central stations had been so increased that the average was 2.4 lb. per kilowatt of energy, an improvement of 25 per cent. This is equivalent to a saving of 15,000,000 tons of coal per year, or \$50,000,000 in the cost of coal alone, not taking into consideration the attendant advantages that this saving implies in the freeing of labor—human effort in the mining, transportation and handling of coal—as well as the capital required for these operations.

There has been a similar, but not so pronounced, improvement in substation apparatus and car equipment.

Manufacturers do not claim that in making these contributions they have been actuated solely by altruistic motives, for with no one is the truth of the Rotary slogan "He profits most who serves best" truer than with the manufacturer. However, in order that we may "serve best" and that both operators and manufacturers may profit, it is essential that we receive the co-operation of operating companies, and I wish to suggest one or two means by which such companies can render effective assistance.

HOW OPERATING COMPANIES CAN HELP

First, adopt as far as possible the standards of manufacturing companies. We believe they have standard apparatus that will be applicable to practically any condition of service, and it is hoped that railway companies will accept such standards, even though they may not embody all detailed features which may be desired by individual companies. Perhaps many do not realize the importance of this or the relatively large increase in expense and delay involved in what may appear a minor change from standards. Detailed engineering instructions must be prepared, drawings changed and frequently

*Abstract of a paper presented at the Midyear Meeting of the American Electric Railway Association, Washington, D. C., Feb. 17, 1925.

new patterns or dies made, with consequent increases in cost and in time for producing such apparatus. We believe that the large number of different types, sizes and varieties of cars, trucks and electrical equipment now desired by operating companies could be substantially reduced if careful study were given to standardization of such apparatus, thereby allowing manufacture on a quantity basis, and by so doing that manufacturing costs and selling prices would be materially reduced.

The operating company can help the manufacturer by anticipating as far as possible his requirements, not only as regards new apparatus, but also supplying materials.

Another method in which railway companies can help not only the manufacturer but also other railways is by

not specifying shipments materially in advance of actual requirements. It is not unusual for us to be advised that certain dates of shipment are required and then, after the apparatus is completed, to receive a statement from the customer to the effect that they were not yet ready to receive it and asking that it be held. Had we been advised earlier that this material would not be required on dates originally specified, it would have permitted us to concentrate our efforts on apparatus which was urgently needed and thereby relieve some other customer of a very trying situation.

The manufacturers are not only willing but anxious to do their part, and I believe that if we all pull together we can expect and deserve a continuance of the improvement which the railway industry has shown recently.

sengers, should undertake to furnish all passenger transportation in its community.

DON'T STANDARDIZE THE BUS BODY TO LOOK LIKE A CAR

You are no longer selling 5-cent car rides. You are purveyors of transportation. The riding public is appreciating to a greater extent than ever that it must pay a fare commensurate with service. It is willing and anxious to pay higher rates of fare to ride in buses. Do not jeopardize that earning capacity of your buses by too great a standardization of bodies, either as to form or appearance. Give no suggestion to the bus rider by standardizing the bus body to look like a street car that he should only pay a street car fare. The bus is regarded by the rider as a Pullman service for which he is willing to pay a Pullman charge. Do not take a chance of giving that rider a day coach impression, for as surely as you do he will demand a day coach rate.

In the operation of bus lines it should be continually borne in mind that your best prospective customer is the automobile owner. I do not know of any better way of antagonizing him than by forcing him off the pavement or frightening him by a bus which at least appears to be nearly as wide as the pavement itself. Manufacturers of buses engaged in competitive selling must pretty much give the purchaser what he wants. Consequently the initiative in keeping bus widths within limits must come from you. The danger is not limited to losing customers, but even more important is the danger of punitive legislation limiting widths to an extent that will interfere with economic operation through limited seating capacity.

SOME ADVANTAGES OF LIMITING BUS DIMENSIONS

This is no mere chimera. Some states have already limited by law permissible widths of buses below 90 in. The only manner in which to avoid the swinging of the pendulum from the present liberality in width limitation to stringent and unreasonable width regulation is by voluntarily limiting your bus body widths to conform to 18-ft. pavement limitations, as the 18-ft. pavement has been adopted as standard by the Bureau of Public Roads of the United States Department of Agriculture and applies to all federal aid projects.

This is true also of lengths of buses. A bus that requires the entire width of the street intersection in order to turn the corner not only violates every principle of traffic safety but antagonizes motorists who are held up and must get out of the way for that operation.

The Motor Vehicle Manufacturers Association and your association during the past year, through the work of representative committees, have agreed on all fundamental principles of law that should control motor bus operation. It is no longer open to argument that bus operations should be regulated as public utilities by state commissions in the same manner that electric railways are now regulated. We may still have some differences of opinion on such questions as the method of taxing

Relation Between Automotive and Electric Railway Industries *

By T. R. Dahl

Secretary the White Company, Cleveland, Ohio
Representing National Automobile Chamber of Commerce

Standardization of Design and Excessive Size of Buses Should Be Avoided—Co-operation of Railway with Motor Vehicle Associations Will Give Excellent Access to Public Opinion

THERE is no doubt of the bonafide operation of buses by electric railways today. In the past there has been a strong suspicion among bus operators that electric railways began bus operations for the purpose of killing that kind of public passenger transportation, having accomplished which they would again furnish only transportation by rail. They suspected that the railways put "trick" in "electric" as a warning to competitors. Present operations by electric railways have effectively removed that suspicion.

Certain conclusions as to the use of the bus can admittedly be accepted, for the present at least, as major premises. First, buses are no longer considered as a passing phase of public fancy. They are here to stay. Second, buses cannot supplant electric railways in handling peak loads in congested districts in large cities. The use of the bus by railways is, therefore, a question of determining the proper place for each service.

It is generally admitted that buses should be operated as extensions of car lines in extending service into new territories where the traffic does not justify the necessary capital expenditure for rails and power. This economic condition exists very generally, as the cost of existing trolley lines is often four and sometimes five times the amount of annual gross revenue, and this means that if 6 per cent is considered a fair return, 24 per cent of the annual gross income must be set aside

to pay interest and dividends on invested capital alone. Buses should be used as feeders to the electric railway lines.

Urban population in the United States is increasing much faster than that of the country as a whole. New building developments are rife in all live cities, and as homes go up in the outskirts of the city, transportation facilities must be provided to serve them. The high cost of construction and maintenance of street railways makes it impossible to extend them into such outlying districts except under exceptionally favorable circumstances. The solution in such cases lies in the bus.

In a number of cities the electric railways themselves have replaced certain lines and in other cities replaced their entire systems with motor buses. This has been particularly true where an extensive paving program by the city has loaded an entirely unjustifiable charge upon the electric railway. Rather than capitalize that additional investment buses have been placed in service, replacing the street car.

The history of city public utilities consistently proves them monopolies. One has but to recall several street car lines, electric light companies, gas and telephone companies operating in the same city. They have been universally unsuccessful until combined and operated as a monopoly. The transportation problem of a city is as much a monopoly as the water, fire and police departments of that city. Transportation being a monopoly, the electric railway, as the established responsible and experienced carrier of pas-

*Abstract of a paper presented at the Midyear Meeting of the American Electric Railway Association, Washington, D. C., Feb. 16, 1925.

the motor vehicle; but the present day extensive operation of buses by electric railways makes it essential that our attitude toward such questions should be one of co-operation.

The bus says it is overburdened by special taxes. The electric railway makes the same claim. We entirely subscribe to your claim that you should not be burdened with paving charges for two reasons. First, it is an anachronism, and second, the charge is a direct charge on the street car rider—the public. There is only one source from which relief from such charges can come, and that is public opinion.

Co-operation with motor vehicle associations will give you the greatest access to public opinion that there is in this country. Would you not admit that if you could reach every telephone subscriber in the United States that you would have access to an overpowering public opinion? Remarkable as it sounds, there are more motor vehicles in this country than there are telephones. That co-operation is offered you, but it cannot be one-sided. You also must appreciate that taxes levied on motor buses are a direct charge against the bus rider, and therefore our co-operative effort must be directed in reducing special taxes and charges levied on both the motor bus and the electric railway for the benefit of our customers who must bear this charge.

We as bus manufacturers have every desire to co-operate with you in another respect. You are our customers. We desire to sell you buses. Having sold you equipment we will not indirectly enter into competition with you by financing competitors' equipment. We do not believe it good business ethics to finance companies operating in competition with our customers, either through stock ownership or by time sales that are a mere subterfuge. In a competitive business where time sales are common and expected we, of course, are compelled to sell equipment on deferred payment plans. We have adopted a plan limiting both the minimum cash required and the maximum of time granted and we will live up to that plan. I am, of course, speaking for the National Automobile Chamber of Commerce, and I expect from your own experience you appreciate that there are "die-hards" in every association who do not live up to the principles agreed upon by their national organization. The best we can say for them is that with your help we will try to show them the error of their ways.

There is one more phase of co-operation that will have an important effect on how buses should be used by electric railways, and that is a national bus association. The American Automobile Association is offering to bus operators throughout the country its facilities as a going users' organization in forming a bus group and affiliating that group with the A. A. A. Independent operators have formed an organization committee to work out a national association of bus operators. Your association has a committee for the purpose of considering some kind of bus group or organization. Three such independent organizations would be fatal to legislative activities and the establishment of policies which the entire automotive

industry could support. Haven't we had enough of divided and therefore dissipated efforts? Have we not found in our dealings with each other that when personal misunderstandings have been removed by personal contacts our competitors are, after all, business men with pretty much the same ideas as our own? Are we not big enough, broad enough and have we not had sufficient experience with the national organizations to appreciate that now, before these various organizations are

formed, all representing pretty much the same business, that we should bring together the representatives of these three proposed national organizations of bus operators in an attempt to work out a plan for one national association, with fair representation for each type of bus operator that can successfully represent this great business? To accomplish this purpose the National Automobile Chamber of Commerce again offers you its wholehearted co-operation.

Opportunity and Responsibility of the Railway Executive*

By G. E. Hamilton

President Capital Traction Company, Washington, D. C.

The American Association Has Helped in Removing Difficulties in the Past—It Should Be of Even Greater Assistance to the Industry in the Future with Its New Organization Perfected



G. E. HAMILTON

THE electric railway with its allied industries has become one of the prime factors in the business and commercial life of our country. It enters into and carries forward urban and suburban growth and development. It promotes business and social intercourse, it populates towns and links city with city in the chain of commercial progress. It gives comfortable and convenient transportation to all. In it are invested billions of the people's money. It constitutes, in the aggregate, one of the largest purchasing powers in the country. It is, in very truth, a vital artery in the body politic and business life of the nation, and for its preservation and future advancement in usefulness and service it requires, on the part of its executives and executive boards, wise, prudent and honest direction within the law; on the part of the public a fuller understanding and closer co-operation, and on the part of the government, sound legislative policies and regulation that is constructive and not destructive.

This industry has grown to its present status of useful greatness by slow

degrees and through difficulties and dangers met and overcome. At one time consisting of unrelated units, small and experimental, scattered over the face of the country, unregulated and operated as private enterprises, lacking often in sufficient capital and inspiring popular prejudice rather than confidence and support, the industry, because of its own mistakes and faults, perhaps, because of popular distrust and of legislative disfavor, was confronted with difficulties and dangers that threatened to destroy it.

At this crucial time, when the clouds were darkest and disaster seemed at hand, the American Electric Railway Association, with a vision broadened and made clear by its long, patient and comprehensive study of street railway management and relations, brought to the companies the counsel and confidence, the initiation and courage needed to meet and overcome the adverse conditions existing, to re-order their broken and faulty lines in policy and direction, and to lay the foundation of successful accomplishment.

Widely separated entities were brought together for conformity in policies, for improvement in operation and for mutual aid and protection through organization.

We have been taught the true meaning and purpose of a public service corporation; a fairer conception of our relations to employees; a fuller recognition of the rights of the people; a realization that reasonable regulation, rightly applied, is strength to the industry. The benefits that have come to us through membership in the association, especially during the last 10 or 15 years, cannot be fully measured or overestimated. It may confidently be expected that this success will be even greater with Mr. Storrs as managing director.

We have grown, and are growing, in the confidence of the people, of regulatory boards and legislative bodies,

*Abstract of an address at the Mid-year Dinner of the American Electric Railway Association, Washington, D. C., Feb. 17, 1925.

and this growth will continue and increase so long as we continue to recognize the rights of the people; to safeguard our stock and security holders, and to live within the law.

Let us then, knowing our duty and seeing our opportunity, endeavor to

meet the responsibilities that come to us; let us sustain and strengthen the guiding hand of the American Electric Railway Association, to the end that we may better serve the people and the interests that are committed to our keeping

Both Buses and Cars Are Needed*

By Guy E. Tripp

Chairman Westinghouse Electric & Manufacturing Company

Maximum Transportation Efficiency Will Be Obtained by
Co-ordinating the Two—Buses Should Provide Special Service
at a Higher Fare—Trolleys Are Essential for Heavy Traffic

THE kinds of service offered by buses and by trolley cars are quite different. Buses are especially adapted to de luxe service in cities and to serving suburban regions where it does not pay to install trolley systems. Their operating cost is relatively high. On the other hand, nothing has yet appeared which equals the trolley car for serving great numbers of people at a low cost.

Local railway systems, or parts of systems, which furnish high-speed transportation by means of subways or elevated tracks hold, and probably will continue to hold, their places as natural monopolies. This is rapid transit of a character which is not open to competition from any radically different form of transportation and whose financial difficulties are susceptible of cure by the simple means of raising the fare charged. If such lines are not permitted to charge a rate which will support them, it is a form of confiscation, whatever may be their contractual obligations. No one else can operate them any better or cheaper than do the present owners, and if operation is undertaken by the people, the people must pay the deficit themselves.

Nothing can be gained for anybody by seizure under the law, because any loss to present security holders is sure to be included in the higher cost of new money in the future. In other words, so long as the physical properties exist and are a public necessity the public cannot escape from paying for the cost of construction and operation of them quite regardless of who owns certain pieces of paper.

Therefore, while the rapid transit problem is serious, the proper solution of it is simple, viz., a rate of fare which is sufficient to preserve good service. Now I approach more difficult ground. Your industry is confronted with the serious competition of automobile buses and that competition is of a character that cannot be met wholly by the simple remedy of raising fares.

In some localities there is actually a

decrease in the number of car riders, and an increase in fare might in some cases accentuate this trouble. Therefore, this new problem of competition is in general a much wider one than the mere rate of fare.

I have called it a new problem of competition, but I would not have you infer that it is an unprecedented one, or that it is the first occasion when a public service, enjoying a natural monopoly, has been confronted with a rival service having quite different characteristics. Some of these rivals have been successful and some have been written off the books. The electric light and power industry threatened to drive the gas business into remote regions, but so far with a conspicuous lack of success. Another, the very recent wireless communication business, has also been a remarkably successful enterprise, but has completely failed to ruin the wire and cable lines. These successful ones, and in fact all successful ones, can only be successful in this day and generation if founded upon fair competition.

You would have an easy and profitable time with the automobile bus competition if it were unfair competition, because the law provides for treble damages in such cases. But is it unfair competition? It is obvious that unfair competition cannot be defined by metes and bounds which can be ap-

plied to all cases, but the principles have been laid down by Professor Stevens of Columbia University and the publication of his treatise while the Federal Trade Commission act was under discussion in Congress undoubtedly had a profound influence upon the legislation. He lays down the following standard:

Fair competition in an economic sense signifies a competition of *economic or productive efficiency*. On economic grounds an organization is entitled to remain in business so long and only so long as its production and selling costs enable it to hold its own in a free and open market. Unfortunately, competition is not always conducted under such conditions of equal opportunity in a free and open market. Productive and selling efficiency alone do not always permit an organization to survive owing to the introduction of methods and practice which destroy the freedom of the market, which hamper the production or selling efficiency of other units and which prevent efficient potential rivals from becoming actual rivals. Such artificial restrictions are clearly unfair, since they hinder or prevent other organizations from competing to the extent which their *productive and selling efficiency may warrant*. If there be a sound basis for competition it lies in the preservation of the economically efficient and the destruction of the inefficient. *It follows that methods which destroy the efficient along with the inefficient are economically unjustifiable and must be regarded as unfair.* . . . In many cases unfairness can not be determined except with reference to the consequence of a given act. The definition of unfair competition therefore should be general in terms. Any act or method of competition which hampers, injures or destroys concerns which could compete on the basis of their productive and selling efficiency should be forbidden, as should also any method except productive and selling efficiency which prevents potential competitors from becoming actual competitors.

Measured by these principles, it appears probable that you are not being attacked by unfair competition; and if this be so, then you are reduced to the process of painstaking comparisons between services rendered if you are to form judgment as to whether this new form of transportation will supplant or supplement the street railway or will itself pass into the shadows of unsuccessful business ventures.

The buses claim, among other things, greater comfort, high speed and public preference for their vehicles. Comfort is becoming a greater and greater factor in our daily lives. Steam heat and electric lights are by no means indispensable, but comfort demands them as it does a thousand other things, and if the bus ministers to the public good cheer, its adoption will be limited only by other considerations which outweigh the comforts.

What are some of the superior enjoyments offered by the auto bus? First comes the relief from the nervous strain of being compelled to board and alight from a vehicle standing in the middle of the street—a feat which only a very few years ago could be lightly attempted by any one in possession of his five senses, but which today in all our large cities has become an adventure to all those who have not become hardened to it by constant exposure. Add to this the disagreeable navigation of the space between the sidewalk and the track in bad weather, and you must conclude that it is more comfortable to have your automobile bus drive up to the curb and invite you to step daintily aboard.

Second, comes the enjoyment of rolling noiselessly along upon pneumatic rubber tires with an occasional toot of



©Underwood & Underwood

GUY E. TRIPP

*Abstract of an address at the Midyear Dinner of the American Electric Railway Association, Washington, D. C., Feb. 17, 1925.

the horn, as compared with the roar of metal against metal and the frequent clanging of the gong.

Third, comes the comfortable assurance that you will get a seat because, when the seats are full, no more passengers are taken on. Of course, you must wait for another bus, but you wait in comparative ease on the sidewalk, which is quite different from frequent round trips to the middle of the street in order to ascertain that there is no standing room in a car.

Yes, there is no denying these comforts, but one can get them all by being wheeled to and from his business in a boardwalk chair, and that introduces the other luxury which the public wants to a degree that ought to cause our ancestors to turn over in their graves. Speed is what we all want. This is the "step on the gas" era.

But the bus also claims speed, and I am bound to say that on well-paved city streets I see no reason to dispute the claim. The car is confined to its track, and when blocked not only must stay where it is but it also stops every car behind it, while the bus can meander around the scenery, making headway all the time. It is obviously more flexible in its operations, and it has been my observation that the gasoline motor is a sufficiently speedy contrivance in itself.

Now about the matter of public preference for the vehicles themselves from the standpoint of design. I am not so sure about that. Some of the buses are very beautiful, but a street car could also be made just as beautiful. You cannot tell about a public preference which is based simply upon style. It may be only a caprice, and we human beings are surprisingly fertile in caprice.

Be that as it may, I have granted about all the claims of the automobile bus, and if the case be closed at this point, we might look forward to a time when the street railway company would wrap its track and equipment in its franchise and put the package away in the garret among the spinning wheels and hair trunks.

However, the uncontested affirmative side of a case does not always present the true picture. This emboldens me to ask the bus a question and request a categorical answer.

"You can doubtless serve some of the people all of the time, and all of the people in some places, but can you serve all the people all the time in all places?"

The answer must be "No," and that opens the way for classification, segregation and other forms of dissection, and the important thing to bear in mind is that the thing to be classified is mass transportation—daily and regular moving of the masses of the people from one or more points to one or more other points. Private automobiles and taxis are not included, they are on the same relative plane as the officers' mess in the army, an organization of almost private household simplicity, while mass transportation may be compared to the quartermaster's vast organization, with rigid discipline controlled by inexorable rules and regulations, all of which are necessary if a great army is to be fed at all.

Broadly speaking, the bus gives either a special or a de luxe service which will cost more to operate than the street car and must, therefore, in the long run, charge a higher fare. There will be no difficulty in securing a widespread belief in this statement in view of the astounding fact that every seventh person in the United States owns an automobile. Nevertheless, there will be a demand for this service because the increasing average incomes of the people permit more and more luxuries, and perhaps the principal limitations to the growth of this particular service will be the fixed capacity of the streets and lack of capacity of the bus to handle "rush-hour traffic."

But when the bus has completely occupied its field, there will still remain millions of people to whom a low rate of fare is a necessity, millions who must be served at those most important hours of the day—the rush hours—and nothing has yet appeared to perform this service except the electric car.

Therefore, it seems clear that the people will demand or need both classes of service. There is nothing unique in that. You may today go to New York in a perfectly comfortable day coach, or by paying more you may ride in a parlor car with the luxury of a Nabob.

Such differentiations are easily dealt with when the whole service is rendered by one company, and that is the solu-

tion of the traction difficulty which I have been discussing. The whole transportation service in a locality should be centered in one organization, which can increase or diminish each class of service according to necessity, and should one class temporarily run into the red ink of adversity, its more prosperous partner may be able to support it through to better days.

Hereafter it should be the established policy of our cities and towns that no bus franchise will be granted to any one unless it is an integral part of a comprehensive plan for rendering a complete transportation service to the people, and that can only be successfully done by one transportation company.

When that policy shall have been adopted by the municipalities and when all the street railway companies recognize, as many of them now do, that the problem of furnishing mass transportation to the public is one which it is their duty to solve by the use of any method which the progress of the times and development of the art may demand, then there will be inaugurated a new era in urban transportation, which will make it a profitable business, but, aside from that, beyond the mere profits in dollars and cents there will be the satisfaction to you of being engaged in a work which is vital to the civic development of the future.

Transportation Men Should Run Transportation Systems^{*}

By Matthew C. Brush

President American International Corporation

The Same Fighting Spirit and Determination to Succeed that Are Used to Combat Storms and Mishaps Should Be Directed to Securing a Square Deal for the Electric Railways

I REALLY am on the outside looking in at your wonderful industry, your marvelous accomplishments, the tremendous value of your business to the country and your earnestness of purpose. I cannot help but feel that you yourself at times do not fully capitalize your position. Your industry is only 37 years old, a mere child. I don't admit yet that I am old, and I remember very well indeed in 1889 on Fourth Avenue in Minneapolis when the first electric railway was constructed. I was a kid, but you must realize that this industry has been completely built up within that period. There are many men in this room tonight who have been actively engaged in its creation from the day of its birth.

You went through the toughest, most discouraging, crude, vicious, trying and heart-breaking experiences of any great industry. Times that tried men's souls. You fought, worked, wept, laughed, pulled, pushed, argued and explained,

and did all of those things that apparently are so necessary to accomplish anything that is worth while.

In your pioneering engineering period you showed a marvelous determination to win against terrific odds—some physical, some financial and some political. You thereby necessarily developed a class of help—men who did things, men who became rugged, mentally and physically, men who are fearless because they are honest and who are working in a high and worthy cause to produce beneficial results for mankind, men who know their business and should be justifiably proud of their accomplishments.

Your industry has very properly been lifted out of the position of a football for politics. There were times not long ago when most public utilities were the victims of political expediency and those concerned in their operation and service suffered accordingly. The situation has shown substantial improvement in this regard, but there is still much to be done.

Now the message I want to leave with you is this: Stand up on your

^{*}Abstract of an address at the Mid-year Dinner of the American Electric Railway Association, Washington, D. C., Feb. 17, 1925.

hind legs and throw your chest out and realize and capitalize and carry into your every effort the heritage that is yours by being the creators of the electric railway industry of this country. You have had so many wallpops, many of you, that you are inclined to duck when some uninformed or unkindly individual or group takes a crack at you. Don't do it. Your whole endeavor is honorably and efficiently to discharge your multitude of responsibilities, and when you are sure you are right stand up and don't be afraid to assert the justice and the merit of your position. You not only have the right but the duty to carry your responsibilities with your head up.

You are the trustees for the employment of more than 300,000 men, receiving approximately \$500,000,000 yearly. You are the custodian for practically \$6,000,000,000 worth of the people's money. A million and a half people have \$6,000,000,000 in your business!

And you also are equally the consumer of approximately \$150,000,000 worth of manufactured material, and in that respect you are responsible for the employment of those additional men. You called upon the investors last year for about \$300,000,000 for additions, betterments and improvements. You carried approximately 16,000,000,000 people. Now, therefore, you have an army of millions of citizens represented by investors, employees, direct and indirect, by passengers, property owners, and so forth, all of whom are entitled to a square deal not only at your hands but at the hands of those who make the laws and regulations governing your work.

You are directing an essential industry, a public utility that is strictly dependent for its necessary authority to live upon legislative authority, subject to millions of laws, regulations and restrictions, by billions of men, municipal, state and federal, elected and appointed. You are subject to the strictest subserviency of legislative and congressional action, and the advocacy of fair, intelligent, constructive regulatory action cannot be too strongly emphasized. Our form of government, however, is a representative government, those holding governmental power being selected by those governed, and 16,000,000,000 people last year rode on our cars, and they are part of the people that are being governed, and 300,000 men worked for you, and they are part of the people that are being governed.

With such a large percentage of those being governed vitally concerned in just and fair treatment of your industry, are you not negligent and betrayers of your trusteeship if you fail properly, legitimately, intelligently, forcefully to make every effort to select for high places those who by training and ability are qualified to pass upon the problems with which you are constantly confronted and then keep them thoroughly and constantly informed? This tremendous power should function through some well-organized, highly efficient, intelligent, simple organization whereby each of your companies can benefit by the experience of all the rest. I confirm the previous speakers in saying that I know of no man in your industry better quali-

fied to carry out the spirit of what he is undertaking than our good friend "Lu" Storrs.

There are men in this room who were in the horse car business, and when the electric car came along they became electric railway men. Practically every electric railway man in the beginning of your industry, in 1888, '89 and '90, was previously a horse car man. As time went on, the necessity of transportation in your communities developed subways and elevated lines, and the same men who had been in surface car work became



© Underwood & Underwood

MATTHEW C. BRUSH

subway and elevated men. No one could possibly have anticipated in the early days of the street car the development that has occurred in subway and elevated transportation in the last 5 or 10 or 15 years.

Now I would like to have you all change your name. I don't like to hear you called street railway men or electric railway men. I like to hear you called transportation men. You have been trained in it, practically all of us here have been in the transportation business directly or indirectly since we were pretty young boys. It is perfectly ridiculous, it is criminal to you, to your heritage and to the community, for men who have had such training as you have had in the handling of men in the transportation business, in the handling of the public, in dealing with commissions, in dealing with the finances of a transportation proposition, to step aside and be superseded by 100 per cent novices, because the particular thing which they run happens to be run by a gallon of gas instead of a few kilowatts.

If there is to be in the community in which you now operate electric railways, under the ground, on the ground, or overhead, any means of transportation which the community justly demands and requires, then you are the men to run it and not some taxicab driver.

I don't think you have any right—and I say you because you are a part of the body of citizens who select the men who make the laws and regulations under which you work—you haven't any right to take my investment as a stockholder in an industry that I have made sincerely and that has been put into a steel rail or into a car, under the supervision of a publicly appointed body, a commission, at a price specified by the commission, and tell

me that because the community demands a wheelbarrow or an airplane I am to lose my money and go out of business and Heinie Kabibble or John Jones is to come in with his vehicle and take my business. I have never found in my experience a commissioner, a superintendent of streets, a Congressman or any publicity appointed or elected man who could stand up and face a genuine, honest-to-God meritorious truth if you will pass it to him, but if you don't pass it to him, you have no kick coming as to what they do to your property.

And I have always found in my limited experience that I never got anywhere with a commission or with a legislator or with anybody before whom I appeared who had the power of regulation of the situation with which I was responsible for unless I kept my 52 cards face up on the table and fought like hell to get a square deal.

There is no reason on earth that you shouldn't do it. You are entitled to it, and it is yours. If by some superhuman means you could put in it your determination to use all the power you have, legitimate power, to secure, first, in offices elective and appointed, the type of man that sits over in the White House, and, secondly, would then fight for the square deal to which you are entitled for your investor, who is your neighbor, and for your employee, who is dependent upon you for his livelihood, and for your passenger, who is entitled to decent and good transportation, with the spirit that most men in this room have fought a snowstorm or wreck, you would raise the percentage of successful companies in this country 50 per cent inside of a month.

There isn't a man here who has been in the electric railway game who hasn't crawled under a motor, crawled under a car, put a car back on the rails, who hasn't fought a strike, who hasn't carried a gun, who hasn't sat up 36 hours fighting a snowstorm, who hasn't been through the hell that goes with this industry. Fortunately you have a breed of pups in the industry that fight for something else besides money or you wouldn't have them, but that tremendous determination to succeed, that pride of accomplishment which makes you run the street railways and carry 16,000,000,000 people in this country is the type of guts that I want you to put into your scrap to get a square deal, to see that you get a square deal from those that tell you what you have got to do.

I pray and genuinely and sincerely beg you to stand up and throw out your chest. If you are crooks you don't belong in the business, and if you are on the square you are entitled to a square deal. And I will give you my word from my own personal experience you will get it, but you will never get it if you duck every time somebody takes a crack at you. If you are right, fight your heads off for it; you are entitled to it, you can get it, and with a close, viciously well-knit together, clean, magnificent team, headed by a corking, thoroughly well-informed, courageous, honest, fearless captain there is no reason why every single electric railway in the United States shouldn't be on the basis of a government bond investment.

Many Committees Meet at Washington

American, Engineering, Claims and T. & T. Executive Committees Head List of
18 Sessions Held in Connection with Midyear Meeting—
Much Important Business Transacted

THE Midyear Meeting at Washington was the occasion for sessions of many of the American Association committees and several from the affiliated associations. In all some 18 meetings were held, including the executive committees of the American, Engineering, Claims and Transportation & Traffic Associations. The new management and operation committee, combining the work of last year's city operation and interurban operation committees, held its first meeting. Detailed reports of many of the sessions are given below.

American Executive Committee

A REGULAR meeting of the executive committee of the American Association was held at the Chamber of Commerce Building, Washington, on Feb. 16. Members present were President J. N. Shannahan, chairman; J. W. Welsh, executive secretary; F. R. Coates, L. S. Storrs, W. H. Sawyer, H. D. Briggs, T. C. Cherry, L. H. Palmer, J. H. Hanna, E. F. Wickwire, C. S. Hawley, Harry Reid, C. E. Morgan, E. P. Waller, B. A. Hegeman, Jr., C. D. Emmons, C. L. Henry and E. C. Faber representing Barron Collier.

F. R. Coates, chairman of the policy committee, recommended that the association co-operate with various utility associations through the committee on education in the preparation of instructional matter regarding the utility industry.

It was recommended that Secretary Welsh write a letter to each manufacturer member calling attention to the basis on which dues are assessed, since some members are not entirely clear on the subject. The recommendation was approved.

For the national relations committee Harry Reid called attention to a meeting to be held the same afternoon at which the question of regulation of buses in interstate service was to be discussed. The committee hopes to co-operate with the steam railroads and the motor vehicle industry in studying the subject for the purpose of bringing the regulation of buses under the Interstate Commerce Commission.

Mr. Emmons, for the publication committee, gave a résumé of the status of *Aera*. The magazine is making satisfactory progress. A ballot was taken among member companies as to the size of page desired. Out of 147 replies only 58 desired a change, so it was voted to retain the present page size.

Myles Lambert suggested that the publication committee give some attention to the preparation of articles of a

popular type such as would appeal to non-technical readers.

For the committee on company and associate membership Mr. Palmer reported that four manufacturers had applied for membership, the Fisk Tire Company, Chicopee Falls, Mass.; the United States Tire Company, New York City; the Lee Tire & Rubber Company of New York, New York City; the Pressed Steel Car Company, Pittsburgh, Pa. The applications were approved.

The individual membership has increased 11, according to Chairman Morgan, being 831 at the present time. His committee proposed that membership cards be issued to individual members. This was approved.

MOTOR BUS POLICY DISCUSSED

A statement of the policy of the association with regard to motor buses, which was worked out in conjunction with the motor vehicle industry, was read by Mr. Storrs. This was a corollary to a similar statement of policy of the automotive industry with respect to the bus, in which the association concurred in every respect. The resolutions adopted by the American Association are published in full elsewhere in this issue.

Considerable discussion followed the presentation of Mr. Storrs' report. It was felt that the resolutions provide that the industry should be protected against unfair competition, and the association is taking a real step forward. The resolutions represent the best thought of leading electric railway and bus men. Following the discussion the code of principles was adopted as read.

NEWLY FORMED ADVISORY COUNCIL APPOINTS MANAGING DIRECTOR

President Shannahan announced that the advisory council appointed at the last meeting of the executive committee met on Feb. 3. B. C. Cobb, chairman of the advisory council, reported that at that meeting arrangements had been made for the appointment of a managing director of the American Electric Railway Association. In view of the serious problems that confront the railway industry, the advisory council, representing in the main the owners, had given the matter much thought, and had decided that the work of the association could be furthered very much by this move. Mr. Cobb announced that Lucius S. Storrs, president of the Connecticut Company, had been selected for the position of managing director. Inasmuch as he will need the strongest financial support that can be given, members of the advisory council had signed an agreement to underwrite the cost of the new

office. This cost, he said, eventually should be distributed over the entire industry, but the underwriting of the movement guaranteed that it could be carried forward. By taking this step, the advisory council feels that the transportation industry can be put where it belongs in the affairs of the nation.

President Shannahan said that it would be necessary to get the association to adopt changes in the constitution. As such changes require a publication of 30 days in advance of action, it was considered necessary to handle the situation temporarily through the executive committee and later put the entire matter before the membership with a vote to be taken at the October convention. The annual surplus existing in the association's finances for the last few years has been taken up by the absorption of the publicity work formerly carried on under the direction of the Committee of 100, and by the growth in the association work, one indication being the change to larger quarters for the New York offices. The new movement will have to be an entirely separate proposition. He felt that each electric railway, large or small, will be so benefited that it should be glad to contribute a proportional amount of the expense.

In the advisory council, said Mr. Shannahan, are men who have not been actively associated with the American Electric Railway Association, but they have come out strongly in favor of the movement. Owen D. Young, for instance, said that there is hard work ahead, and unless everybody stands back of it the movement will not be effective.

Mr. Sawyer moved that in accordance with the recommendations of the advisory council, and until suitable changes can be made in the constitution of the association, the position of managing director be created. The motion was adopted unanimously.

MR. STORRS ELECTED

Upon motion of Mr. Morgan, Mr. Storrs was elected to the position by a rising vote of the association.

Mr. Sawyer congratulated the executive committee on taking this step and Mr. Shannahan for initiating and carrying the movement to a successful conclusion, stating that it is the most outstanding progressive and constructive work that the association has done.

Mr. Storrs replied briefly, expressing his thanks and stating that it would be necessary for him to get the duties of the new office outlined before it would be possible to make any definite statement of the policy to be adopted.

Mr. Cobb stated that he expects the

manufacturers to do some of the underwriting of this new move. Several of the leading manufacturers have already agreed to make substantial contributions, and it is known that others will follow.

ATLANTIC CITY AGAIN CHOSEN FOR CONVENTION

Mr. Sawyer, chairman of the committee on convention location, requested Mr. Morgan, chairman of the subcommittee, to present his report. Mr. Morgan stated that after investigating several cities which had been proposed for the next convention, Atlantic City had been agreed upon by the committee. The terms will be practically the same as those of last year, except that additional facilities will be provided to make possible the exhibit of electric railway cars on the pier, or adjacent thereto. Mr. Sawyer moved that an exhibit be held in connection with the convention and that Atlantic City be chosen as the location of the meeting and that it be held the week beginning Oct. 5. The motion was adopted.

Mr. Hanna extended the greetings of the city of Washington to the association on the event of the Midyear Meeting.

As chairman of the special committee on referendum 44 of the United States Chamber of Commerce, Mr. Hanna made a report covering postal rates, postal salaries, and the possibility of providing an emergency fund for the Postmaster-General.

President Shannahan read a letter from the Electric Truck Transportation Corporation dealing with the matter of store-door delivery in connection with electric railway service. Mr. Reid stated that the same matter had been brought to the attention of the Central Electric Railway Association. Mr. Morgan said that it also had been taken up with the New York State Electric Railway Association. After some discussion, Mr. Reid moved that the Transportation & Traffic Association be authorized to make a study of the subject. The motion was carried.

Secretary Welsh stated that the Department of Commerce wants figures of monthly traffic of electric railways in connection with its survey of current business. This was desired in the form of an index figure of all companies that can be included in such a survey. On motion of Mr. Lambert, it was decided to instruct Mr. Welsh to prepare such information as was needed for the Department of Commerce.

Mr. Henry made a report on the action of the Interstate Commerce Commission in the Lackawanna case, in which section 15A of the interstate commerce act was involved. Under the decision this company was brought under the clause. He suggested that all electric railways study the decision.

President Shannahan announced the membership of the exhibit committee, with C. E. Morgan as chairman, and the entertainment committee, with S. J. Cotsworth as chairman. The complete personnel of these committees will be announced later.

It was decided to hold the next meeting in New York City on April 3, beginning at 10 a.m.

Special Taxes

A MEETING of the committee on special taxes of the American Association was held at Washington, D. C., on Feb. 16. W. H. Maltbie of Baltimore acted as chairman. Others in attendance were: A. C. Watt, A. G. Neil, A. W. Flor and F. W. Doolittle representing Edwin Gruhl. Mr. Maltbie reviewed the previous work of the committee, after which methods were considered of bringing the electric railway tax situation to the attention of the industry as a whole and the public at large.

Location of Next Convention

THE committee on place and date of the next convention met in Washington on Feb. 16 and decided to recommend to the executive committee that the annual convention be held in Atlantic City during the week of Oct. 5. The committee had canvassed the situation in several other cities and concluded that the greatly increased facilities which will be provided for exhibiting electric railway cars this year at Atlantic City made it practicable and desirable to hold the convention there again. The details as to these added facilities will be announced later but they have been definitely provided for, and the committee therefore urged that railway companies and car builders lay plans for an extensive railway car exhibit in October.

Co-operation with Manufacturers

A MEETING of the American Association committee on co-operation with manufacturers was held in Washington on Feb. 16. The members present were E. F. Wickwire, chairman; G. A. Barnes, C. L. Hancock for W. D. Blatz, W. H. Boyce, David Cameron, E. C. Faber, E. E. Kretschner, H. H. Lloyd, Herbert Metz, J. C. McQuiston, George R. Rowland, C. N. Uhl, and C. L. Van Auker.

It was suggested by Mr. Lloyd that the committee on purchases and stores be enlarged to admit purchasing agents of manufacturer members. This suggestion was made because of the similar character of problems of purchasing of railway companies and manufacturing companies. It was thought that this would also make possible closer co-operation with the publicity work of this committee.

There was some discussion of changes in the form of stickers used for shipments made by manufacturer members. These stickers recently have been supplied in quantity to manufacturers by the publicity committee. Another subject along the same line was the discussion of signs to be placed on carload shipments.

Another suggestion was that stuffers be prepared for packages going into the home from manufacturers. This would include such merchandise as electrical goods and similar equipment manufactured for household use.

A suggestion was made which it was considered would be of considerable benefit. This was that letters be written by manufacturer members to realtors, merchants and others in their

cities calling attention to their dependence for prosperity on the type of transit available and the prosperity of the electric railway industry. The absolute necessity of protecting the electric railway companies so that they would be able to give the necessary type of service should also be pointed out.

National Relations

THE committee on national relations of the American Association met in its office in the Munsey Building in Washington, Feb. 16. Chairman Harry Reid presided. Members present were: H. G. Bradley, C. D. Cass, F. C. Hamilton, C. L. Henry, W. V. Hill representing Frank Karr and H. A. Mitchell, D. W. Snyder, Jr., and A. F. Van Deinsse.

Some discussion of the various amendments to the Federal law relating to the inspection of steam locomotive boilers led to the appointment of a sub-committee to handle the interests of electric railways in taking up this subject with the Interstate Commerce Commission.

It also was decided to send a copy of the examiners' report in the Lackawanna case before the I.C.C. under Section 15-A of the transportation act to each member for his information and study.

Selling Transportation

AT A meeting in Washington on Feb. 16 the committee decided to draw up no conclusions, but to have the members in the near future submit in writing their individual views as to the more practical steps that can be taken to make railway service more attractive to the public. The committee is hopeful that from these reports enough material can be taken to compile a pamphlet which can be placed in the hands of all engaged in the conduct of electric railway operations.

Bankers are requiring evidence from railways of merchandising enterprise just as they require it from their borrowers engaged in mercantile pursuits, it was said. They are not going to be impressed with efforts that get no further than signs on the exterior of cars or such publicity as can be secured gratis in local newspapers. Signs on the outside of cars are all right as one means of getting business, but they should not be on rough-looking boards. General appearances should be kept up to the highest point possible even where atrocious looking fenders are required.

ATTRACTIVE VEHICLES ATTRACT PATRONS

Varnish and the upholstery play no small part in attractive business to the bus. Cars should be kept well painted. It was suggested that the color might be changed each time the exterior is repainted. Interiors should be made more ornate. More stress should be placed on cleanliness. Noise should be reduced. Manufacturers of cars should be encouraged to do more research in the effort to produce a vehicle as nearly noiseless as possible.

The 1910 street car is no more attractive than is the 1910 automobile. Records show that new equipment increases receipts. While all cars cannot

be of the 1925 model, 1925 service Ideals can be applied generally.

The privately owned automobile is the principal competitor of the electric railway. Means must be devised to prevent further losses of traffic to the private automobile and to get back as much as possible of that already lost. Some of the larger properties may believe that congestion is solving this problem, but means are being found to relieve congestion and progress in that direction may be expected to become more marked. Convenient routing, greater frequency of service, greater average speed, plus the great advantage of lower cost, all will tend to accomplish this end. The bus can be used to great advantage in attaining these objectives. That vehicle should not be regarded as a feeder only. It offers an opportunity to furnish a different class of service, supplementing that furnished on the rails. It offers new possibilities in de luxe and express services. The bus is a new baby in the transportation family. It is just as sure to stay in the family as is the human infant.

The public is getting the idea that the electric railway is doomed. This is making financing more difficult. The fallacy of this conclusion should be offset by educational efforts. Electric railways now must go out after business, and this is calling for greater managerial ability as well as for specialists in merchandising. Higher salaries must be paid so as to attract the best executive talent.

The committee decided not to devote time at the meeting to the discussion of freight and express services as these subjects were dealt with quite fully last year.

In the absence of Chairman Wood, G. H. Clifford of Fort Worth presided. Other members in attendance were: J. A. Dewhurst, C. A. Graves, H. Etheridge, J. P. Griffin, C. D. Smith, E. S. Wilde and W. H. Boyce.

Company Membership

THE committee on company and associate membership met in Washington on Feb. 16 with chairman L. H. Palmer presiding. Other members present were: F. G. Buffe, J. H. McClure, W. J. Harvie, F. C. J. Dell, W. K. Archbold, J. W. Hancock, J. H. Drew and Harry L. Brown. The list of non-member railways was gone over. Each one considered a prospect was assigned to a member of the committee for attention.

Insurance

THE committee on insurance of the American Association developed its program for the year at a meeting at Washington on Feb. 16. Paul Wilson of Cleveland, chairman of the committee, presided. Members in attendance were O. H. Bernd, C. H. Bourne, F. J. Petura and B. L. Tomes.

It was decided to have two sub-committees. The first, under the chairmanship of Mr. Daniels, will consider the general subject of fire insurance, i.e., what the principal hazards are on electric railway properties, the princi-

pal available precautions in connection with them and the effect of "good housekeeping" in connection with electric railway risks.

The second sub-committee, under the chairmanship of Mr. Bernd, will study the present status of the industry as regards fire insurance, and will collect data in regard to losses and what is actually being done to prevent fires. These committees will report before the next general meeting of the committee, to be held probably in June.

Management and Operation

THE first meeting of the newly organized committee on management and operation of the American Electric Railway Association was held at Washington on Feb. 16. Those present were F. R. Coates, chairman; R. F. Carbutt, vice-chairman; G. C. Hecker, secretary; E. S. Wilde, H. L. Mitchell, C. D. Porter, R. W. Emerson, G. W. Welsh, and D. E. Blair, regional directors; C. A. Graves, A. J. Stratton, D. J. Locke, H. B. Potter, G. M. Alexander, B. C. Edgar, J. P. Ingle, J. B. Stewart, Jr., R. J. Lockwood, J. M. Bosenburg representing D. W. Snyder, Jr., D. L. Fennell, J. P. Griffin and W. V. Hill, members; J. N. Shannahan, L. S. Storrs, C. D. Emmons, J. W. Welsh, J. W. Colton and Morris Buck, guests.

After the meeting was called to order by Chairman Coates, he presented Mr. Storrs, the new managing director of the association. Mr. Storrs addressed the meeting briefly, stating that he could not think of anything that can be more constructive from the managerial side—which means also the ownership side—than the work of this committee, with the opportunity it gives for the exchange of ideas.

Executive Secretary Welsh explained how the work of this committee can be tied in with the work being carried on at association headquarters. Mr. Hill felt that personal contact between members of the committee and the properties they visit is necessary to get results that will be beneficial.

PRESIDENT SHANNAHAN TELLS COMMITTEE OF ITS OPPORTUNITY

Addressing the committee briefly, President Shannahan said that scarcely any of the other committees of the association have the opportunity for effective work that this one has. Originally, he was skeptical of what could be accomplished, but a year's contact has shown him the value of the work that has been done and can be done. The greatest benefit, he believes, accrues to the men who make the visits to the properties. For the association these men act as liaison officers and provide a means for getting more active support of the association. The benefit, he said, far outweighs the cost in effort and money.

Mr. Emmons said that he wanted members on the committee to take back the message to the presidents of their companies that he is sold on the value of the work. Any possible resentment from managements who might feel that the visits of committeemen are an unwarranted interference should be al-

layed by the character of the members and the message they carry to the properties.

Chairman Coates said that when he agreed to accept the position on the committee he had done it with a reservation that a vice-chairman be selected who would be able to carry on the work in the same manner as he would do it. He said that the vice-chairman was fully as capable of doing the work as he was, and having had the experience of last year was probably better qualified than himself.

PLAN OF ORGANIZATION AND PROCEDURE PRESENTED

Mr. Carbutt then took the chair. He presented for the consideration of the committee a tentative plan of organization and procedure, which has been prepared by an advisory board. This board, consisting of Messrs. Carbutt, Blair, Boyce, Emerson, Riddle, G. W. Welsh and Wilde, had held a meeting with the regional directors on Jan. 30, and had given its approval of the organization plan. Mr. Carbutt outlined the contents of the plan and then placed it before the members for open discussion.

Mr. Fennell raised the question of the overlapping of work of this and other committees, stating that the question had come up at the meeting of another committee the same morning. Mr. Carbutt explained that there was no overlapping and that the functions of this committee were entirely separate from those of committees which were making separate investigations, either by questionnaires or by personal contact.

G. W. Welsh stated that in preparing the handbook there will necessarily be some duplication, but any other committee can go out and get the information. The most important change in the organization of the work for this year is the appointment of regional directors, formerly known as regional vice-chairmen. Last year these men had to do all of the work of visiting properties, while this year the plan is to have all of the members active and to have them divide the work of making the visits to properties. He feels that it is impossible to get much information of value by correspondence, so that the personal visits are of greatest importance.

Mr. Mitchell felt that members of the committee should be informed as to whether companies listed for visits are members of the association or not. It was suggested that on page 5 of the "Plan of Organization of Procedure," par. F (a) should be modified to read: "Co-ordination of electric railway and motor bus and truck service for all transportation requirements." Mr. Stewart moved the adoption of the report. This was seconded and carried.

Mr. Emerson said that no arrangement has yet been made for dissemination of the information that is being collected by the committee. Mr. Carbutt explained that arrangements have been made for editing the material at headquarters. The method of publication will be determined later, depending on the amount of material and the time at which it is received. It was pointed out that in obtaining information from

companies, one important idea was to get a list of available men for a personnel file of individuals available for committee appointments.

It was suggested that meetings of the advisory board be planned for April 25 and July 15. Mr. Emerson suggested that a deadline be established at April 15, when the portion of the reports that are to be considered at the April 25 meeting should be available in New York. Mr. Lockwood felt that this date was too soon for the complete report, but that a part of the work can be ready at that time. Mr. Fennell felt that the date was rather early, but will do all he can.

Mr. Blair proposed that the attempt be made to get a report written by some one in the company visited who is vitally interested in the work under discussion. It was felt by the members that this method is desirable wherever practicable.

Valuation

THE work of the committee on valuation of the American Association since the last convention was reviewed at a meeting at Washington, D. C., on Feb. 16. F. W. Doolittle of New York, chairman, presided. The other members present were: Thomas Conway, Jr., C. W. Gillespie, F. C. Hamilton, W. H. Maltbie, Albert S. Richey and E. Stenger.

The subject that was first discussed was a progress report of the subcommittee on terminology, of which T. E. Francis is chairman. This subcommittee was appointed for "the study of elements of value claimed from time to time by public utility companies, looking toward the preparation of a list of terms with their definitions, which would be suggestive to the members of the American Electric Railway Association who are at any time confronted with the preparation of a valuation case." One purpose of this study was to reduce unnecessary and more or less meaningless terms, for the sake of clarity and definiteness. Another purpose was to list the principal elements of reasonable and fair value which otherwise might be overlooked in a valuation case. The members of this subcommittee, besides Mr. Francis, are J. A. Emery and James Walker.

The valuation committee also considered the possibility of compiling index numbers of electric railway construction costs, and other topics.

Engineering Executive Committee

THE executive committee of the Engineering Association met in Washington on Feb. 16. Those in attendance were: President C. H. Clark, chairman, R. C. Cram, R. H. Dalglish, F. H. Miller and G. C. Hecker. Considerable time was devoted to a discussion of standardization work and committee procedure. A sub-committee of the executive committee was appointed, consisting of R. C. Cram, chairman; M. B. Rosevear and Charles R. Harte, to study the entire procedure of standardization of the association, including the plan suggested several years ago

of a unit method of voting on the adoption of standards.

President Clark reported that the proposal to organize a committee on rail corrugations was approved by the executive committee of the American Association and that the executives of several companies expressed their desire and willingness to appoint representatives on the committee and bear their proportion of the expenses of a trip of inspection of the various properties throughout the country to study rail corrugation.

It was announced that the executive committee had approved by letter ballot the proposal to assign this year to the power transmission and distribution committee the subject of radio interference.

The secretary announced the completion of the draft of the bibliography on heavy electric traction by Professor Warner, and the bill for his services in this connection was approved. The matter of publishing the bibliography will be referred to the committee on heavy electric traction.

Announcement was made of the approval by the executive committee and indorsement by the association of various recommendations of the Division of Simplified Practice, Department of Commerce, among which were sizes and gages of sheet steel, steel lockers, reinforcing bars for concrete work and others. Announcement was made also that the committee on purchases and stores is studying the standard purchasing department forms recommended by the Division of Simplified Practice and that their recommendations would be presented for consideration of the executive committee at a later date. A special committee consisting of H. H. George, chairman; P. V. C. See and W. F. Graves reported favorably on the recommendations of the central lumber standards committee, and the executive committee authorized formal indorsement by the association of those recommendations.

The secretary announced the appointment of various members of the association on committees of the American Engineering Standards Committee, and reported the status of the work of the sectional committee on tubular steel poles, which was organized under the association's sponsorship.

Welded Rail Joints

A FIVE-HOUR meeting of the committee on welded rail joints was held at the Bureau of Standards on Feb. 16, in the morning and afternoon. Various types of testing apparatus for use on railway track were examined by the members. At the time of the meeting the repeated impact testing machine was out of service on account of failure of one of the mechanical parts.

Co-operative study with the General Electric Company in the matter of theograph tests was described by E. M. T. Ryder. No great progress has yet been made, but arrangements are under way looking to joint study with the track committee of the American Railway Engineering Association. It is hoped to develop information as to stresses caused by the passage of a car over a defective joint.

It is hoped also that valuable data on stresses in rails and across joints will be developed by means of telemeter tests. Apparatus used for this purpose was described in *ELECTRIC RAILWAY JOURNAL* for Feb. 14. It is expected that the information thus secured will be helpful in guiding the work of the committee.

Progress report No. 3 of the committee will probably be issued late in February and will bring up to date the results of tensile tests, as well as give information on the results being obtained from the repeated impact testing machine. Outlines were given of five separate investigations of features connected with the problem of seam-welded joints.

A newly developed contact pyrometer designed by C. O. Fairchild of the Bureau of Standards was exhibited at the meeting. Its use will assist the study of actual rail temperatures at different stages of the welding process.

A special report was made on a series of tests of seam-welded joints prepared at Baltimore and at Boston. These tests were made for the purpose of studying the effects of preheating and postheating. The report was presented by R. B. Fehr, development engineer Rail Welding & Bonding Company, and will be included as an appendix to Progress Report No. 3.

Those present at the meeting were: E. M. T. Ryder, C. H. Clark, R. H. Dalglish, A. P. Way, R. C. Cram, H. H. George, H. M. Steward, C. S. Kimball, J. O. Handy, R. B. Fehr, A. F. Blaser, C. W. Bolton, R. R. Seward, W. V. Armstrong, J. H. Deppeler, R. C. McCloy, E. W. Carruthers representing the Pennsylvania Railroad, William Spraragen, and G. K. Burgess, chairman. Other representatives of the Bureau of Standards were: H. L. Whittemore, J. R. Randolph, R. S. Johnston, C. O. Fairchild and O. S. Peters.

A sub-committee on examination of broken test specimens met at the Bureau of Standards on the preceding Saturday afternoon and examined all of the test joints which have thus far been subjected to tensile tests in the Emery testing machine. It is the intention to include the report of this special sub-committee in the forthcoming Progress Report No. 3. Those present at this meeting were: S. W. Miller, R. B. Fehr, E. M. T. Ryder, H. F. A. Kleinschmidt, J. H. Deppeler, R. C. Cram, William Spraragen, H. L. Whittemore and R. S. Johnston.

Transportation and Traffic Executive

IN CONNECTION with the Washington meeting, the Transportation & Traffic executive committee held a session on Feb. 16. Those present were Chairman T. C. Cherry, president of the association; G. H. Clifford, J. V. Sullivan, Samuel Riddle, W. H. Boyce, Edward Dana, E. M. Walker, Paul E. Wilson, and E. J. Murphy of the association staff. C. W. Chase was also present representing the accident prevention committee, of which he is chairman. Mr. Boyce pre-

sented the report of the committee on selling transportation in the absence of Chairman Wood of that committee.

A. H. Ferrandou, chairman of the committee on bus operation, and G. B. Anderson, chairman of the committee on traffic congestion, presented reports.

It was decided to request of the American Association that no committee be permitted to send out questionnaires that overlap the field of work being investigated by the committee on traffic congestion.

President Cherry named a program committee for the annual convention, which consisted of G. H. Clifford, chairman; Samuel Riddle and Joseph V. Sullivan.

Relief of Traffic Congestion

A DESCRIPTION of the plan which the Los Angeles Railway proposes to follow to secure relief in that city was given by G. B. Anderson at a meeting of the committee on relief of traffic congestion of the T. & T. Association held at Washington Feb. 16. He said that a very satisfactory system of traffic regulation had been in force during the holiday season, but that it had been repealed immediately thereafter. Until recently the merchants and the automobile interests have opposed parking restrictions. Lately, however, the former have begun to see that unlimited parking is a handicap to their business. Only the street car riders are unrepresented in discussions of this subject, and it is therefore the duty of the railway to represent their views. In Los Angeles the railway is endeavoring to present to the public the facts concerning traffic congestion, and to create a sentiment favorable to measures of relief.

Conditions differ in various places, in the opinion of W. S. Bell, who said that ordinarily relief cannot be secured if it is thought by the public to be primarily in the interests of the railway. The situation must be allowed to work itself out, he said, which it will do in time. Already pedestrians are becoming much incensed at the disregard shown by automobile drivers. W. E. Thompson agreed to this view and said that it was best to allow civic organizations to take the initiative in matters of traffic regulation.

Relief can best be secured by going directly to the local police in the opinion of E. S. Rider.

J. E. Heberle spoke of the difficulty of securing relief in Washington, due to the fact that the personnel of the Public Utilities Commission and the District Commission is the same, and these men are extremely busy. The necessity of securing Congressional approval also complicates matters. In general, he thought that best results are secured by sitting in with other bodies.

It was decided on motion by D. L. Fennell that the efforts of the various railways to secure relief of congestion be carefully observed, and that the American Electric Railway Association keep the member companies posted concerning the results.

Major R. J. Lockwood, assistant manager United Railways of St. Louis,

suggested that the committee study as soon as possible the recommendations of the Hoover conference on highway safety. A motion to this effect made by Mr. Fennell was carried. It was the sense of the committee that in order to avoid duplication the subject of city operation, so far as it applies to traffic congestion, be left to this committee for study. It was further thought that this committee should undertake to furnish full data on the subject of congestion to the publicity committee, to facilitate its work.

It was the sense of the meeting that, in so far as possible, left-hand turns at intersections and in the middle of the block should be prohibited in congested districts.

The next meeting is to be held in St. Louis, some time in April, at the call of the chairman. Those present were: W. S. Bell, W. E. Thompson, D. L. Fennell, E. S. Rider, J. E. Heberle, J. P. Tretton, F. R. Latta, W. H. Maltbie, C. L. VanAuken representing J. A. Grieg and G. B. Anderson, chairman.

Accident Prevention

THE first meeting of the new joint committee on accident prevention of the Transportation & Traffic Association and the Claims Association was held in Washington on Feb. 16. Members representing the T. & T. Association were: C. W. Chase, president Gary Street Railway, chairman; A. B. Miles, J. A. Jarvis and J. B. Stewart, Jr. Those representing the Claims Association were: G. R. Whitmore, Wallace Muir, E. J. Paige, W. H. Hyland, C. W. Giltner, H. E. Cady, R. A. Sears and Samuel Riddle. J. J. Reynolds, J. B. Stewart, Jr., J. S. Kubu and S. G. Herrell were also present.

Wallace Muir opened the meeting in the absence of the joint chairman, C. B. Hardin, and asked Mr. Chase to preside. Mr. Muir explained that the purpose of the formation of the joint committee was to avoid duplication of work by two separate committees, one in each association. He outlined the recommendations adopted by the committees last year as a guide to the new committee in planning its work.

It was decided that the work of collecting accident statistics be continued this year, and a motion was passed authorizing the chairman to appoint a special sub-committee of three members with E. J. Murphy of association headquarters as chairman.

Highway Crossing Safety Discussed

Mr. Muir recommended that a sub-committee be appointed to draft a bill for regulation of automobiles and the improvement of highway and crossing safety, with a view toward getting this uniform bill adopted by the various states throughout the country. It was proposed that the American Electric Railway Association undertake to obtain the approval and support of the National Safety Council for this bill, and that the association and the Safety Council jointly take the subject up with the United States Chamber of Commerce in an endeavor to get that organization to sponsor this bill as its own. It was suggested that an effort

be made to get the Chamber of Commerce to send a copy of the bill to the Governor and Attorney-General of each state, urging them to submit the bill to their respective legislatures for adoption as uniform legislation throughout the country.

This suggestion was questioned by R. A. Sears, general claims attorney Boston Elevated Railway, on the ground that the work started by the recent Hoover safety conference had already assumed a much wider significance than could such a movement as that suggested and that a definite set of principles for the formulation of safety regulation legislation had come out of the Hoover conference with the full approval of the many varied interests represented, including the automobile and railroad industries.

A general discussion ensued of the merits of various plans for working out the idea. It was finally decided to delegate Mr. Muir to outline the main features of his plan to the presidents of the Transportation & Traffic Association and the Claims Association, and to request them to discuss this subject with the executive committee of the American Association.

Discussion of the subject of following up trainmen to check the observance of safety rules led to a number of suggestions for improving the results obtained. Mr. Stewart outlined some of the methods used on the Youngstown Municipal Railway for stimulating safety work and said that the results accomplished by the application of the Louisville safety contest plan had been highly successful.

Mr. Sears outlined the plan used by the Boston Elevated Railroad of presenting safety discussion in a new form. He explained the use of a series of pamphlets in which a report of an imaginary meeting between the men, the general manager and the claim department is given in such a manner as to stimulate the interest and imagination of the employee reading the pamphlet.

After an afternoon session a motion was passed instructing the program committee to secure outlines of the work done by eight or nine railway companies which had made outstanding records in accident prevention. These are to be used as the basis for articles to be published and subsequently reprinted in pamphlet form and distributed to the executives of operating companies.

Claims Executive

AT A brief meeting on Monday afternoon the committee expressed its approval of the uniform motor vehicle law suggested by the accident prevention committee. Some time was given to consideration of subjects suggested for discussion at the annual convention, but no definite action was taken. It was decided to hold the next meeting of the committee in New York on April 3. Those present were: S. J. Herrell, G. T. Hellmuth, E. L. Lindemuth, J. S. Kubu, C. B. Proctor, H. E. Fisher, W. H. Hyland, J. J. Reynolds, Wallace Muir, and H. D. Briggs, president of the Claims Association.

Census Report Shows Status of Electric Railways

Tables and Other Statistics from the Census Report Just Made Public Give Interesting Facts About the Growth in Traffic of the Electric Roads Between 1917 and 1922

PRELIMINARY figures of the status of the electric railway companies of the United States contained in the census report for the year ended June 30, 1922, have been published in this paper.* The complete census report on electric railways has now been made public and has been issued from Washington. The report is printed on a page of more convenient size

*See ELECTRIC RAILWAY JOURNAL for Oct. 6, Nov. 3, Nov. 10, Dec. 1, Dec. 22, 1923, and Feb. 9, 1924.

than previous issues, the page being 6x9 in. instead of 9x11½ in. There are 256 pages in the report. The period covered by the operating statistics is generally the calendar year 1922. The statistics for equipment and balance sheets relate to Dec. 31, 1922, and for number of employees, June 30.

Statistics on electric railways have been compiled by the Census Bureau every five years since 1902. The census is primarily of street and interurban railways,

TABLE I—PRINCIPAL STATISTICS: 1922 AND 1917

	1922	1917	Per Cent of Increase ¹		1922	1917	Per Cent of Increase ¹
Number of companies.....	1,200	1,307	-8.2	Condensed income accounts:			
Operating.....	858	943	-9.0	Operating companies—			
Lessor.....	342	364	-6.0	Income from all sources.....	\$1,049,048,321	\$730,108,040	43.7
Miles of single track operated,				Operating income—			
all tracks ²	43,931.86	44,835.37	-2.0	Railway operating revenues	925,477,485	650,149,806	42.3
Running track.....	42,450.09	43,364.83	-2.1	Railway operating expenses	678,563,107	421,250,838	61.1
Main track.....	40,364.33	41,446.67	-2.6	Net revenue—Railway operations.....	246,914,378	228,898,968	7.9
Road or first track.....	31,264.26	32,547.58	-3.9	Auxiliary operations—			
Second track.....	8,796.33	8,656.08	1.6	Revenues.....	91,241,607	59,675,286	52.9
Other main track (third, fourth, etc.).....	303.74	243.01	25.0	Auxiliary operations—			
Sidings and turnouts.....	2,085.76	1,918.66	8.7	Expenses.....	49,232,061	31,343,816	57.1
Track in carhouses, storage yards,				Net revenue—Auxiliary operations.....	42,009,546	28,331,470	48.3
etc.....	1,481.77	1,470.54	0.8	Net operating revenue.....	288,923,924	257,230,438	12.3
Miles of motor-bus lines (one-way)	685.36	(³)	.....	Taxes.....	64,788,315	45,756,695	41.6
Rolling stock:				Operating income.....	224,135,609	211,473,743	6.0
Cars, number.....	99,255	102,603	-3.3	Non-operating income.....	32,329,229	20,282,948	59.4
Revenue cars.....	88,707	91,448	-3.0	Gross income.....	256,464,838	231,756,691	10.7
Passenger.....	77,301	79,914	-3.3	Deductions from gross income—			
Express, freight, baggage, and mail.....	11,406	11,534	-1.1	Rent for leased roads (lines and terminals).....	43,771,275	48,302,823	-9.4
Service cars.....	10,548	11,155	-5.4	Interest on funded and unfunded debt.....	139,126,390	119,113,018	16.8
Electric locomotives.....	404	357	13.2	Miscellaneous.....	16,379,561	7,889,920	107.6
Motor buses, number, one-man.....	370	(³)	.....	Total deductions.....	199,277,226	175,305,761	13.7
Persons employed by operating companies:				Net income.....	57,187,612	56,450,930	1.3
Number.....	300,523	294,826	1.9	Dividends.....	36,729,243	48,337,435	-24.0
Salaries and wages.....	\$445,680,135	\$267,240,362	66.8	Surplus.....	20,458,369	8,113,495	152.2
Salaried employees—				Lessor companies—			
Number.....	30,239	27,151	11.4	Income from all sources.....	31,855,434	43,216,501	-26.3
Salaries.....	\$57,469,091	\$33,909,674	69.5	Rentals from operating companies.....	31,103,067	42,759,850	-27.3
Wage earners—				Miscellaneous income.....	252,367	456,651	64.8
Number.....	270,284	267,675	1.0	Deductions from income.....	14,837,025	17,897,373	-17.1
Conductors, motormen, and one-man car and bus operators.....	130,628	136,184	-4.1	Interest on funded debt.....	13,120,349	16,147,380	-18.7
Other wage earners.....	139,656	131,491	6.2	Taxes and miscellaneous (maintenance and organization, etc.).....	1,716,676	1,749,993	-1.9
Wages.....	\$388,191,044	\$233,330,688	66.4	Net income.....	17,018,409	25,319,128	-32.8
Conductors, motormen, and one-man car and bus operators.....	\$205,238,478	\$127,222,144	61.3	Dividends.....	16,933,751	24,925,706	-32.1
Other wage earners.....	\$182,952,566	\$106,108,544	72.4	Surplus.....	84,658	393,422	-78.5
Traffic:				Capitalization:			
Passengers carried.....	15,347,519,966	14,506,914,573	5.8	Total (gross).....	5,446,794,547	5,532,223,818	-1.5
Car lines.....	15,331,399,851	14,506,914,573	5.7	Operating companies.....	4,734,678,330	4,626,288,027	2.3
Motor-bus lines.....	16,120,115	(³)	.....	Lessor companies.....	712,116,217	905,935,791	-21.4
Total revenue passengers.....	12,679,349,042	11,304,660,462	12.2	Capital stock.....	2,329,173,090	2,473,846,651	-5.8
Car lines.....	12,666,552,734	11,304,660,462	12.0	Operating companies.....	1,972,832,506	2,006,151,013	-1.7
Motor-bus lines.....	12,791,308	(³)	.....	Lessor companies.....	356,340,584	467,695,638	-23.8
Regular-fare passengers.....	12,217,523,995	11,304,660,462	8.1	Funded debt ⁷	3,117,621,457	3,056,377,167	1.9
Car lines.....	12,205,118,008	11,304,660,462	8.0	Operating companies.....	2,761,845,824	2,620,637,064	5.4
Motor-bus lines.....	12,405,987	(³)	.....	Lessor companies.....	355,775,633	437,740,103	-18.7
Pay-transfer passengers.....	461,825,047	(³)	.....	Gross capitalization per mile of track owned ³	126,075	126,021	.....
Car lines.....	461,439,726	(³)	.....	Net capitalization on account of electric railways (excluding investment securities and non-operating property).....	4,661,923,873	4,889,962,096	-4.7
Motor-bus lines.....	385,321	(³)	.....	Net capitalization per mile of track owned ³	107,908	111,391	.....
Free-transfer passengers.....	2,499,822,382	3,021,137,935	-17.3				
Car lines.....	2,496,570,207	3,021,137,935	-17.4				
Motor-bus lines.....	3,252,175	(³)	.....			
Free passengers.....	168,348,542	181,116,176	-7.0				
Car lines.....	168,271,910	181,116,176	-7.1				
Motor-bus lines.....	76,632	(³)	.....			
Car and bus mileage.....	2,145,398,078	2,139,801,530	-0.7				
Revenue car-mileage.....	2,124,523,362	2,087,818,534	-0.9				
Passenger.....	2,068,293,833	199,052,633	-1.0				
Express, freight and mail.....	56,229,529	51,982,996	8.2				
Non-revenue car-mileage.....	13,258,312	(³)	.....			
Bus mileage.....	7,116,404	(³)	.....			
Car and bus hours.....	203,785,888	203,056,931	-0.6				
Revenue car-hours.....	201,838,263	199,052,633	-1.0				
Passenger.....	197,146,335	4,004,298	17.2				
Express, freight and mail.....	4,691,928	(³)	.....			
Non-revenue car-hours.....	1,325,573	(³)	.....			
Bus-hours.....	622,052	(³)	.....			

¹ A minus sign (—) denotes decrease; percentage not computed where base is an average or is less than 100.

² Includes track laying outside the United States (1922 and 1917, 27.06 miles).

³ No data.

⁴ Numbers employed June 30, 1922, and Sept. 29, 1917.

⁵ Not reported separately. Included in regular-fare passengers.

⁶ Represents 770 companies for 1922 and 836 for 1917.

⁷ Includes real estate mortgages amounting to \$13,795,318 for 1922 and \$7,197,895 for 1917.

⁸ Exclusive of track not represented by capitalization, as follows: 1922, none; 1917, 5.30 miles.

TABLE II—INCOME AND EXPENSE PER REVENUE PASSENGER:¹
1912 to 1922

	1922 Cents	1917 Cents	1912 Cents
Income from all sources.....	8.27	6.46	6.14
Railway operations.....	7.30	5.75	5.62
Auxiliary operations.....	0.72	0.53	0.33
Non-operating income.....	0.25	0.18	0.19
Operating expenses (railway and auxiliary)...	5.74	4.00	3.49
Taxes.....	0.51	0.40	0.37
Interest.....	1.10	1.20	1.19
Other deductions from income.....	0.47	0.14	0.18
Net income.....	0.45	0.72	0.91
Dividends.....	0.29	0.65	0.74
Surplus.....	0.16	0.07	0.17

¹ Based on total regular-fare passengers and pay-transfer passengers, car lines and bus lines.

TABLE III—COMPANIES OPERATING OVER 500 MILES OF SINGLE TRACK IN 1922

Name of Company	Miles of Line Operated	Miles of Single Track Operated
Pacific Electric Company, California.....	631.23	1,114.86
Chicago Surface Lines, Illinois.....	510.76	1,070.33
The Connecticut Company, Connecticut.....	601.14	860.59
Public Service Railway Company, New Jersey.....	496.67	846.62
Eastern Massachusetts Street Railway Company, Massachusetts ¹	532.05	707.44
Philadelphia Rapid Transit Company, Pennsylvania.....	449.57	695.11
New York State Railways Company, New York.....	337.33	594.79
Pittsburgh Railways Company, Pennsylvania.....	329.42	592.26
Boston Elevated Railway, Massachusetts.....	237.46	509.51

¹ Reported as Bay State Street Railway for 1917.

TABLE IV—TRACK MILEAGE 1922 AND 1917 BY LOCATION AND CHARACTER OF SERVICE

	1922	1917	Per Cent Increase
<i>By location:</i>			
Surface.....	43,004.61	44,119.29	-2.5
Public thoroughfares.....	25,856.95	26,284.53	-1.6
Private right of way.....	17,147.66	17,834.76	-3.9
Elevated.....	601.69	497.29	21.0
Subways and tunnels.....	325.56	218.79	48.8
<i>By character of service:</i>			
City and suburban.....	26,123.93	26,737.75	-2.3
Interurban.....	17,807.93	18,097.62	-1.6

TABLE V—TYPES OF CARS IN 1922, 1917 AND 1912

Kind	1922	1917	1912	Per Cent Distribution	1922	1917	1912
Cars—Total.....	99,255	102,603	94,016	100.0	100.0	100.0	100.0
Revenue cars.....	88,707	91,448	83,956	89.4	89.1	89.3	89.3
Passenger.....	77,301	79,914	76,162	77.9	77.9	81.0	81.0
Closed.....	56,840	50,487	48,123				
Open.....	8,789	15,893	18,993				
Convertible or semi-con- vertible.....	10,224	12,601	17,985				
Combination passenger and baggage, express, freight, or mail.....	1,448	933	1,061				
Special cars (included in pas- senger cars)—							
Parlor.....	51	73					
Sleeping.....	7	7					
Private.....	20	36	149				
Other special ²	23	23					
Express, freight, and baggage Mail.....	11,352	11,442	7,794	11.5	11.2	8.3	8.3
Service cars.....	54	92					
Snowplows.....	1,477	1,642					
Sweepers.....	1,442	1,275	10,060	10.6	10.9	10.7	10.7
Sprinklers.....	207	278					
Work and other service cars..	7,422	7,960					
Cars equipped with electric motors.....	75,335	76,429	73,758	75.9	74.5	78.5	78.5
Cars equipped with gasoline en- gines.....	8	19	21				
Electric locomotives.....	404	357	277				

² Reported as "Combination—closed and open."

³ 1922, one ambulance car, six dining cars, ten funeral cars, and six cars of a character not stated; 1917, eight funeral cars, six excursion cars, and nine cars of a character not stated.

TABLE VI—DENSITY OF TRAFFIC ON ELECTRIC RAILWAYS, NEW YORK CITY, CHICAGO, PHILADELPHIA, AND BOSTON IN 1922¹

	Miles of Main Track	Number of Revenue Passengers ¹	Average number of Revenue Passengers Per Mile of Track	Per Car- Mile
New York City:				
Surface.....	194.41	351,018,849	1,805,560	12.83
Elevated and subway.....	352.20	1,102,953,327	3,131,611	5.83
Chicago:				
Surface.....	993.13	762,629,211	767,905	6.57
Elevated and subway.....	151.52	181,280,754	1,196,415	3.51
Philadelphia ²	634.68	691,177,642	1,089,018	8.46
Boston ³	441.31	356,423,418	807,649	7.06

¹ Includes pay-transfer passengers for 1922 as follows: New York, 13,326,466; Chicago, none; Philadelphia, 55,206,600; Boston, none.

² Includes a small amount of surface trackage operated as part of elevated systems.

³ Comprises both elevated and surface trackage.

TABLE VII—REVENUE PASSENGERS AND REVENUE-CAR MILEAGE—PER CENT DISTRIBUTION AND PER CENT OF INCREASE, BY GEOGRAPHIC DIVISIONS: 1922, 1917 AND 1912

Division	Per Cent 1922	Per Cent 1917	Per Cent 1912	Per Cent Increase ¹ 1917- 1922	Per Cent Increase ¹ 1912- 1917
Revenue Passengers ²					
United States.....	100.0	100.0	100.0	12.0	18.4
New England.....	9.0	11.0	11.0	-8.7	18.2
Middle Atlantic.....	39.3	37.4	36.8	17.8	20.3
East North Central.....	23.5	24.0	22.6	9.8	25.6
West North Central.....	7.4	8.0	8.2	4.4	14.6
South Atlantic.....	6.6	6.6	6.5	11.1	21.2
East South Central.....	2.4	2.6	2.8	5.5	8.6
West South Central.....	3.0	2.8	2.8	21.5	15.7
Mountain.....	1.2	1.4	1.6	-8.3	5.2
Pacific.....	7.6	6.2	7.6	36.8	-2.2
Revenue-Car Mileage					
United States.....	100.0	100.0	100.0	-0.9	10.7
New England.....	8.2	9.8	10.0	-16.9	8.8
Middle Atlantic.....	34.1	33.5	34.9	0.8	6.3
East North Central.....	25.3	25.2	24.5	-0.3	13.9
West North Central.....	8.2	8.1	8.0	-0.1	12.8
South Atlantic.....	7.2	6.6	6.5	7.5	12.8
East South Central.....	2.8	3.1	3.0	-9.1	10.9
West South Central.....	3.8	3.7	3.2	2.7	25.2
Mountain.....	1.5	1.6	1.6	-7.6	9.2
Pacific.....	8.9	8.4	8.2	4.2	13.3

¹ A minus sign (—) denotes decrease.

² Includes pay-transfer passengers; does not include motor-bus passengers.

TABLE VIII—CAPITALIZATION AND FLOATING DEBT, OPERATING AND LESSOR COMPANIES, COMBINED: 1922 AND 1917

	1922	1917	Per Cent Increase ¹
Capital stock.....	\$2,329,173,090	\$2,473,846,651	-5.8
Common.....	1,842,639,433	2,012,189,294	-8.4
Preferred.....	486,533,657	461,657,357	5.4
Funded debt.....	3,103,826,139	3,051,179,272	1.7
Real-estate mortgages.....	13,795,318	7,197,895	91.7
Floating debt.....	176,734,785	166,592,228	6.1
Total.....	\$5,623,529,332	\$5,698,816,046	-1.3
Stocks and bonds of other electric railway companies and treasury securities.....	446,435,768	390,489,091	14.3
Gross capitalization less stocks and bonds of other electric railway companies and treasury se- curities.....	\$5,177,093,564	\$5,308,326,955	-2.5
Investments in other securities and non-railway properties.....	338,434,906	251,772,631	34.4
Net capitalization:			
Including floating debt ²	\$4,838,658,658	\$5,056,554,324	-4.3
Per mile of track.....	111,999	115,186	
Excluding floating debt ²	4,661,923,873	4,889,962,096	-4.7
Per mile of track.....	107,908	111,391	

¹ A minus sign (—) denotes decrease.

² Includes debenture stock amounting to \$3,830,551.

³ Includes real-estate mortgages.

TABLE IX—FINANCIAL STATISTICS FOR VARIOUS GROUPS OF ROADS

	Surface 1922	Railways Without Commercial Lighting 1917	Elevated Railways and Subways 1922	1917
Number of companies.....	722	758	7	7
Ratio of operating expenses to operating revenues (per cent).....	72.6	63.8	63.9	46.2
Per mile of track:				
Operating revenues.....	\$22,589	\$16,137	\$123,392	\$102,891
Railway operations.....	22,489	16,070	120,046	100,231
Auxiliary operations.....	100	67	3,345	2,660
Operating expenses.....	16,402	10,297	78,864	47,544
Railway operations.....	16,355	10,266	77,470	46,560
Auxiliary operations.....	47	31	1,394	984
Net operating revenue.....	6,187	5,841	44,528	55,347
Railway operations.....	6,134	5,804	42,577	53,670
Auxiliary operations.....	53	37	1,951	1,677
Per car-mile:				
Operating revenues.....	Cents 44.56	Cents 30.87	Cents 34.90	Cents 27.73
Railway operations.....	44.36	30.74	33.95	27.01
Auxiliary operations.....	0.20	0.13	0.95	0.72
Operating expenses.....	32.35	19.70	22.30	12.81
Railway operations.....	32.26	19.64	21.91	12.55
Auxiliary operations.....	0.09	0.06	0.39	0.26
Net operating revenue.....	12.21	11.17	12.59	14.91
Railway operations.....	12.10	11.10	12.04	14.46
Auxiliary operations.....	0.10	0.07	0.55	0.45
Per revenue passenger: ¹				
Operating revenues.....	7.17	5.67	6.07	5.43
Passenger.....	6.61	5.26	5.56	5.06
All other.....	0.56	0.41	0.51	0.37
Operating expenses.....	5.21	3.62	3.88	2.51
Railway operations.....	5.19	3.61	3.81	2.46
Auxiliary operations.....	0.02	0.01	0.07	0.05
Net operating revenue.....	1.96	2.05	2.19	2.92

¹ Revenue passengers comprise regular-fare passengers and pay-transfer passengers on both car and bus lines.

TABLE X—OPERATING EXPENSES OF OPERATING COMPANIES
BY ACCOUNTS: 1922 AND 1917

Account	1922	1917	Per Cent of Increase ¹	Per Cent Distri- bution in 1922
Number of companies.....	858	943	-9.0	
Operating expenses, total.....	\$227,795,168	\$452,594,654	60.8	100.0
Railway operating expenses.....	\$678,563,107	\$421,250,838	61.1	93.2
Way and structures.....	102,003,281	55,470,419	83.9	14.0
Equipment.....	87,236,577	48,981,554	78.1	12.0
Power.....	107,245,578	76,958,461	39.4	14.7
Conducting transportation.....	286,684,634	174,972,645	63.8	39.4
Traffic.....	2,732,173	2,301,817	18.7	0.4
General and miscellaneous.....	92,940,078	62,738,265	48.1	12.7
Transportation for investment —credit.....	-284,214	-172,323	64.9	a
Auxiliary operations—expenses.....	49,232,061	31,343,816	57.1	6.8

¹ A minus sign (—) means decrease.
² Less than one-tenth of 1 per cent.

and the statistics of electrified steam roads are not included in the general tables. The statistics of the Chicago Tunnel Company are also not included.

The census reports four surface railways still operated by cable, two in California and two in Washington. It also shows three roads still operated with animal traction, though only one, located in Arkansas, with 0.75 mile of track, was operated exclusively by this form of power. The others were one electric railway company in Pennsylvania and one in New York which reported small amounts (totaling 3.27 miles) operated by animal power for the purpose of holding franchises.

The final chapter in the report gives statistics of the sixteen municipally operated electric railways and the one state-operated railway.

For the first time, the Census Bureau collected data in regard to motor bus operation by electric railways, pay-transfer passengers and non-revenue car-mileage and car-hours. The information in regard to motor bus operation related only to those lines which form integral parts of electric railway companies, and did not cover independent bus lines or separate lines operated under stock ownership by railway companies.

For the first time since statistics of street and electric railways have been compiled by the Census Bureau, the mileage shows a decrease. The miles of single track operated in 1922 were 903.5 less than in 1917. This total included 294.14 miles of idle track. There was also a decrease in the number of passenger cars operated, in value of road and equipment and in number of companies. On the other hand, the number of employees increased 1.9 per cent, the number of revenue passengers (including pay-transfers) increased 12.2 per cent, and operating revenue increased 42.3 per cent.

The principal statistics of the electric railways, with the exception of statistics on power plants, are given in Table I. Table II gives the income and expenses in cents for revenue passengers from 1912 to 1922.

The average size of each operating company in 1922 was 51.20 miles of single track, 90 passenger cars and 350 employees, and the average company operated 2,416,231 passenger car-miles during the year and carried 14,797,381 revenue passengers. There were nine companies which operated more than 500 miles of track in 1922, as shown in Table III.

DATA ON TRACK AND ROLLING STOCK

All kinds of railways decreased their total length during the half decade from 1917 to 1922 except "elevated railways," and "subways and tunnels." This is shown by Table IV.

Table V shows for the last three census years the different kinds of cars used in electric railway service. Of this number, 75,335 cars were equipped with electric motors, as follows: 298 were equipped with one motor each, 42,811 with two motors, 297 with three motors and 31,929 with four or more motors. Of the 98,042 cars equipped with brakes, 80,936 were equipped with air brakes, 1,190 with other kinds of power brakes, and 15,916 with hand brakes exclusively. Of the 88,432 revenue cars, 16,506 were mounted on single trucks and 17,926 on double trucks.

POWER EQUIPMENT

The report shows an increase in the number of companies purchasing electrical energy instead of generating it. The proportion to the entire number reporting no power plant equipment was 73 per cent in 1922 as compared with 62.4 per cent in 1917. There was also a decrease in the output of stations operated entirely for electric railway purposes. The total power station capacity for electric railways, central stations and electrified sections and tunnels of steam railroads increased greatly, however, this total being, in rated horsepower 17,425,580 in 1917, and 24,800,732 in 1922.

STATISTICS ON TRAFFIC

In their statistics on electric railway traffic the compilers of the census report point out that some zone fare companies count passengers as the number of persons paying fares in each fare zone, whereas on other lines each passenger is counted but once regardless of the distance he rides. They also declare that some com-

TABLE XI—ANALYSIS OF INCOME PER REVENUE PASSENGER, ALL OPERATING COMPANIES AND COMPANIES OF CLASS X (OR COMPANIES WITHOUT COMMERCIAL LIGHTING) FOR THE UNITED STATES: CLASS X, CITY AND SUBURBAN TRackage ONLY, FOR SELECTED STATES: 1922 AND 1917

Class and State	Number of Companies		Number of Revenue Passengers 1922	1917	Average per passenger (cents)									
	1922	1917			Income from All Sources		Operating Expenses		Taxes		Deductions from Gross Income		Net Income	
	1922	1917			1922	1917	1922	1917	1922	1917	1922	1917	1922	1917
All companies.....	858	943	12,679,349,042	11,304,660,462	8.27	6.46	5.74	4.00	0.51	0.41	1.57	1.55	0.45	0.50
Class X—All companies without commercial lighting.....	222	758	11,349,255,972	9,630,773,816	7.40	5.83	5.21	3.62	0.45	0.38	1.43	1.43	0.31	0.40
Companies of class X, operating city and suburban trackage only—selected states:														
California.....	17	20	354,682,561	215,509,448	5.28	5.02	3.91	3.78	0.31	0.32	0.66	1.10	0.39	10.18
Illinois.....	28	34	1,072,831,278	989,209,604	7.56	5.23	5.13	2.83	0.45	0.48	1.15	1.21	0.84	0.71
Kansas.....	4	3	17,083,325	12,337,265	6.07	5.18	4.44	2.90	0.43	0.46	0.63	1.22	0.33	0.60
Kentucky.....	7	8	107,318,921	99,688,947	6.49	5.25	4.55	3.11	0.47	0.47	0.97	1.17	0.50	0.50
Massachusetts.....	17	21	610,555,942	522,227,088	8.55	5.21	6.08	3.76	0.37	0.25	1.40	1.01	0.70	0.19
Missouri.....	12	10	300,350,798	272,283,832	7.03	5.03	5.22	3.44	0.63	0.42	1.03	0.97	0.14	0.20
New Jersey.....	12	9	445,341,799	397,649,320	6.77	5.10	4.68	3.03	0.65	0.42	1.37	1.46	0.08	0.19
New York.....	58	59	2,579,741,680	1,943,501,048	5.52	5.45	3.77	3.01	0.32	0.37	1.54	1.63	10.17	0.44
Ohio.....	19	15	535,125,100	458,789,663	4.81	4.21	3.50	2.91	0.37	0.34	0.26	0.55	0.69	0.41
Pennsylvania.....	53	60	844,213,378	794,916,862	6.48	5.51	4.38	2.97	0.37	0.27	1.41	1.65	0.32	0.62
Texas.....	13	18	92,745,119	63,638,242	6.60	5.19	4.84	3.72	0.39	0.31	0.85	1.07	0.52	0.09
Wisconsin.....	7	9	14,571,611	126,310,082	6.66	4.48	5.57	2.74	0.33	0.29	0.89	0.68	10.14	0.27

¹ Deficit.

TABLE XII—EMPLOYEES, SALARIES, AND WAGES, BY OCCUPATIONAL CLASSES, FOR OPERATING COMPANIES: 1922 AND 1917

Class	1922	1917	Per Cent of Increase ¹
Number of companies.....	858	943	—9.0
Persons employed:			
Number.....	300,523	294,826	1.9
Salaries and wages.....	\$445,680,135	\$267,240,362	66.8
Salaried employees—			
Number.....	30,239	27,151	11.4
Salaries.....	\$57,489,091	\$33,909,674	69.5
Officials—			
Number.....	2,017	1,883	7.1
Salaries.....	\$8,946,893	\$6,786,469	31.8
Managers and superintendents—			
Number.....	3,358	2,889	16.2
Salaries.....	\$10,403,759	\$6,205,507	67.7
Clerks, stenographers, and other salaried employees—			
Number.....	24,864	22,379	11.1
Salaries.....	\$38,138,439	\$20,917,698	82.3
Wage earners:			
Number ²	270,284	267,675	1.0
Wages.....	\$388,191,044	\$233,330,688	66.4
Conductors, motormen, one-man car and bus operators—			
Number.....	130,628	136,184	—4.1
Wages.....	\$205,238,478	\$127,222,144	61.3
Conductors—			
Number.....	58,988	68,352	—13.7
Wages.....	\$92,939,236	\$62,992,587	47.5
Motormen—			
Number.....	58,166	67,832	—14.2
Wages.....	\$92,953,300	\$64,229,557	44.7
Operators, one-man cars—			
Number.....	13,070	(³)	.....
Wages.....	\$18,797,669	(³)	.....
Operators, buses—			
Number.....	404	(³)	.....
Wages.....	\$548,273	(³)	.....
All other wage earners—			
Number.....	139,656	131,491	6.2
Wages.....	\$182,952,566	\$106,108,544	72.4

¹ A minus sign (—) denotes decrease.
² For 1922 as of date June 30; for 1917, Sept. 29.
³ Not reported separately.

panies, in compiling their revenue car-mileage, count a motor car and trailer as one car and others count them as two. This should be considered in connection with the accompanying tables, as should also the fact that while all companies reported car-miles, only 89.7 per cent of the companies reported car-hours, although these companies carried 95.2 per cent of the total revenue passengers (not including motor bus passengers). In the tables, also, pay-transfer passengers are included with the regular fare passengers as "revenue passengers," but motor bus passengers are not included in the general statistics.

Table VI shows some figures on density of traffic in four large cities in 1922. This table does not include all of the roads in the city mentioned in each case.

Table VII shows per cent distribution and per cent increase by geographical divisions of revenue passengers and car-miles for the last three census years.

The report gives extensive statistics on the finances of operating and lessor companies. The figures for both classes of companies, combined, for 1917 and 1922,

are given in Table VIII, with the net capitalization, after securities owned are deducted, and the net capitalization per mile of track. Of the 1,154 operating and lessor companies, 315 operating companies and 180 lessor companies paid dividends. The average rate was 5.4 per cent for the operating companies and 7 per cent for the lessor companies, or an average of 5.8 per cent on the outstanding capital of those companies which declared dividends.

Table IX shows some interesting averages for 1922 and 1917. In the first group of two columns the railways are those surface railways where the company does not do any commercial lighting, so that the receipts and expenses for auxiliary operations are small. The final two columns related to elevated railways and subways. The census report gives similar figures for roads combining railway with lighting operations.

Table X shows the operating expenses by primary accounts for 1922, with percentage distribution and per cent increase over 1917. The report also brings out the fact that while the taxes paid by the industry as a whole have increased 41.6 per cent since 1917, the increase has been greater for the larger than for the smaller properties. On roads with receipts of more than \$1,000,000 the per cent increase has been 44.4, for those between \$250,000 and \$1,000,000, 40.9, and for those with receipts of \$250,000 and less, only 4 per cent.

Table XI is published to show the considerable variation in the income, operating expenses, etc., per revenue passenger for different states.

EMPLOYEES

Table XII shows the number of employees, salaries and wages by occupational classes for the last two census years. In this grouping "officials" comprise presidents, vice-presidents, secretaries, financial secretaries, treasurers, assistant treasurers, auditors, counsel and similar officials. Managers and superintendents include the general manager, assistant general manager, general superintendents and superintendents of departments. The third class is made up of clerks, stenographers and other salaried employees not included in the first and second class. Under the main heading "wage earners," "other wage earners" are made up of power plant employees, employees of maintenance of way, transportation and equipment departments, elevated and subway guards, and employees of electric light and power departments which did not make complete separate reports for such departments.

The striking feature of this table is a large reduction

TABLE XIII—STATISTICS OF EMPLOYEES FOR COMPANIES OF DIFFERENT CLASSES, 1922

	Companies Divided According to Annual Income from Railway Operations				Companies		Elevated Railways and Subways ^a	Surface Lines ^a
	All Companies	Over \$1,000,000	Between \$1,000,000 and \$250,000	Less than \$250,000	Without Commercial Lighting	With Commercial Lighting		
Salaried employees								
Number, total.....	30,239	22,315	5,190	2,734	22,959	7,251	1,372	28,867
Per 10 miles of track.....	6.88	8.11	5.08	4.40	6.37	9.30	15.99	6.70
Per 1,000,000 car-miles.....	14.23	12.82	20.17	21.70	12.57	24.41	4.52	15.85
Per 1,000,000,000 revenue passengers.....	2.39	2.01	4.71	5.73	2.02	5.47	0.79	2.64
Wage earners								
Number total.....	270,284	222,105	33,921	14,258	224,474	45,665	26,007	244,277
Per 10 miles of track.....	62	81	33	23	62	59	303	57
Per 1,000,000 car-miles.....	127	128	132	113	123	154	86	134
Per 1,000,000,000 revenue passengers.....	21	20	31	30	20	34	15	22
Conductors, motormen and one-man car and bus operators								
Number total.....	130,628	107,554	15,786	7,288	111,063	19,485	63,911	126,717
Per 10 miles of track.....	30	39	15	12	31	25	46	29
Per 1,000,000 car-miles.....	61	62	61	58	61	66	13	70
Per 1,000,000,000 revenue passengers.....	10	10	14	15	10	15	2	12

^a—The group classification covers all tracks of the companies allocated according to the principal class of track, the "Elevated and Subway" group including a minor amount of surface trackage and the "Surface" group including some elevated and subway trackage.
^b—Exclusive of guards on subway and elevated trains, who are classified under "all other wage earners."

in the number of conductors and motormen since 1917. Of course, this is due in very large part to the increased use of one-man cars, and it will be noted that the total number of motormen and one-man car operators reported for 1922 exceeds the number of motormen (including one-man car operators so far as reported) shown for 1917. The report says that there is also probably more efficient operation and a tendency on the part of some companies to operate fewer cars in order to reduce expenses.

Table XIII shows some interesting averages as regards employees of companies of different types. During 1922 the average number of revenue passengers per employee was 42,148 and per car operator 97,267. Car operator in this connection is understood to be a motorman, conductor or one-man car operator. Elevated railway and subway guards are not included in this designation.



An Interior View of the Dayton Car After Rebuilding
Cross-seats were put into the rear section to induce passengers to move back from the front entrance. All piping and control wiring are installed under the longitudinal seats.

Center-Entrance Trailers Converted to One-Man Motor Cars

People's Railway Company of Dayton Installed Front Entrance Door so That Passengers Board at the Front and Alight at the Center

BY THE conversion of three center-entrance trailers into front-entrance, center-exit, one-man cars the People's Railway of Dayton recently obtained needed additional motor car equipment at minimum cost, and at the same time succeeded in making the converted cars pleasing in appearance and efficient in operation. This work, which was done by the Cincinnati Car Company, involved the addition of four GE-264 motors with single-end K-35 control, rebuilding of former trail trucks for motor operation and installation of a front door, air compressors and safety car devices.

The original trailers, which are shown in an accompanying illustration, were equipped with two hand-operated sliding doors at the center, and with longitudinal seats throughout. These cars were originally built to handle war-time traffic, which consisted of very heavy peak loads from certain designated points, for which trailer equipment was considered particularly suited. In addition to this, motor cars in Dayton were at that time operated by two men, and the use of trailers meant the saving of one man for each two-car unit. After the war, and with the adoption of one-man operation,

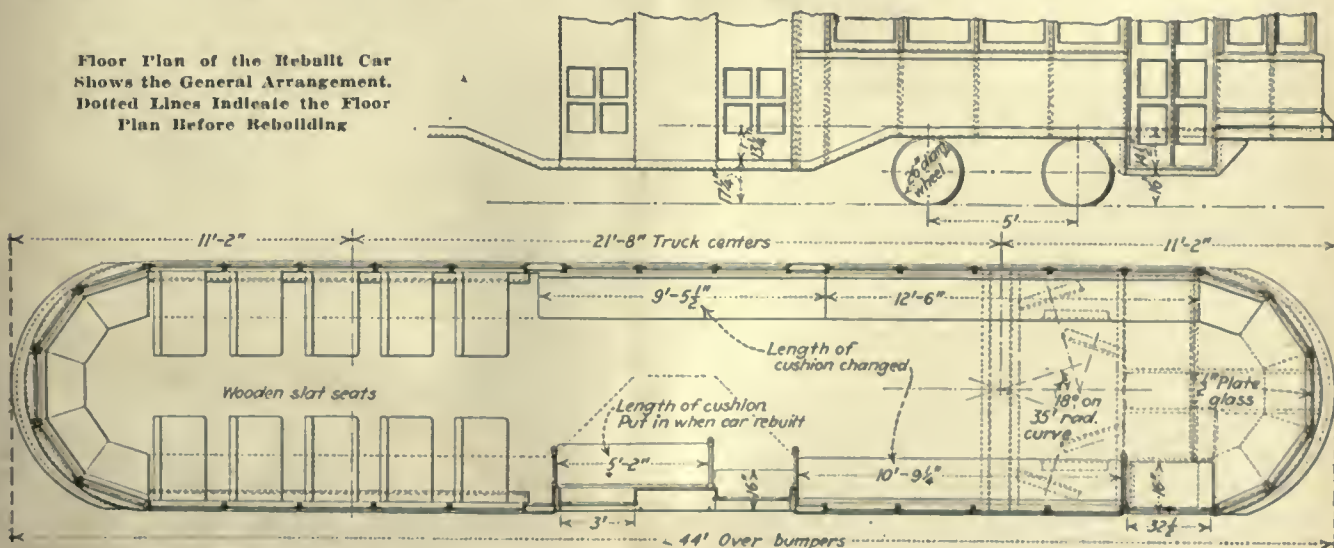
the conditions which originally favored the building of trailer equipment were eliminated, and consequently it became desirable to convert this equipment into one-man motor cars suitable for all-day service. The operation of several old and heavy motor cars to meet the traffic demands made it particularly desirable to provide additional light-weight one-man equipment which would allow the heavier and older cars to be reserved for rush-hour service.

The appearance and floor plan of the converted cars are also illustrated. It was considered desirable to substitute cross-seats for the longitudinal seats in the rear section of the car, so as to induce entering passengers to move back from the front entrance. Since only one of the center doors was needed as an exit, the other center door was blocked shut and additional seats installed in front of it as shown in the drawing. The large step well formerly in the center of the body was covered over except for a small space in front of the exit. This allows passengers to move readily from the front to the rear section, without stepping into the well.

In doing this work, the step-well structure was left in place, and a false floor was laid over it so as to make the whole body floor level. Additional framing was installed so that the side sill could be cut to form the well for the front door.

A CP-27 air compressor was installed under the car near one rear corner. Due to lack of room under the

Floor Plan of the Rebuilt Car Shows the General Arrangement. Dotted Lines Indicate the Floor Plan Before Rebuilding





Appearance of the Dayton Trailer Before and After It Was Rebuilt Into One-Man Motor Car

The rear door near the center was blocked shut and a new entrance door put in at the front end.

Lamps installed in the small housings over the tops of the doors illuminate the steps and the ground at night, when the

doors are open. The front end of the car, before reconstruction, is shown at the right.

car on account of the framing of the old center well the air tanks were installed inside the body under the longitudinal seat. All piping and control wiring were also put under the longitudinal seat, the wiring being installed in flexible conduit. The M-28 brake valve, which is part of the safety car equipment, controls the front-entrance door, while the center door, which is also operated with a National Pneumatic engine, is controlled from an auxiliary valve installed in a convenient position.

Inside the car a mirror is mounted in front of the operator so that he can see passengers at the center door. A similar exterior mirror on the vestibule corner post gives him a view of the center door from the outside so that he can see when passengers have alighted so that it is safe to close the door. This is interlocked so that he cannot start with the door open. Outside lamps mounted above the front and center doors illuminate the step and the ground near the car. These lamps are lighted by switches on the floor engines when the doors are opened.

Conversion of the trucks for motors involved rebuilding with larger diameter axles and 26-in. wheels in place of 24-in. This work increased the weight of each truck from 3,600 lb. to 4,000 lb. without gears. The original light weight of the trailers was 21,368 lb. complete. The changes and additions for one-man motor operation increased this weight to 28,800 lb. complete. The cars have a seating capacity of 50 passengers. This is slightly less than that of the original trailers due to removal of the circular seats at the front end to provide space for the operator.

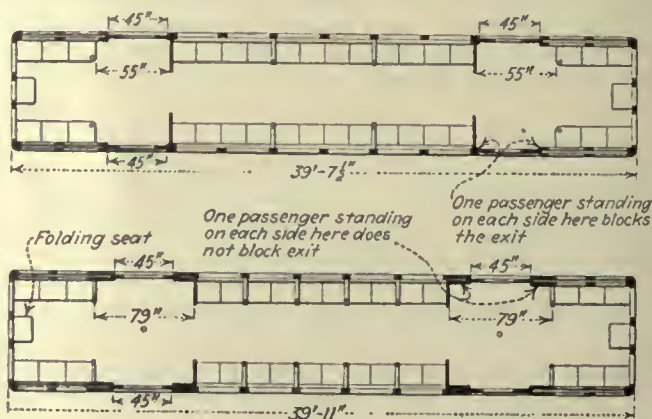
New Door Arrangement on the Berlin Elevated

To Prevent Door Blockades in the Cars Recently Installed, the Seating Arrangement Has Been Changed and Thus More Space for Passenger Movement Secured

IN THE new side-door cars now being put in service on the Berlin Elevated & Underground Railway, a different arrangement of doorway has been introduced to prevent the blockading of the side entrances by standing passengers. This same difficulty of blockading has been experienced on rapid transit lines in the United States as well as in Berlin. It is found that when cars are crowded, there is a tendency on the part of one or more passengers at an entrance to remain close to the opening and maintain a position there at

stops by grasping any handhold that may be available. This requires other passengers to force a way past. The thought of those thus blocking the doorway is evidently that if they step out onto the platform to leave the passage clear, they will not recover their advantageous position near the door.

In the United States efforts to overcome this practice have included the removal of all handholds on the inside



The Old Type of Car on the Berlin Elevated Above. The Latest Type Below. The Latter Drawing Shows the Wider Spacing of Seats Opposite the Side Doors

of the car near the doors, and in one case, the Interborough Rapid Transit subway in New York City, a dividing barrier has been placed at the middle of the entrance so as to provide two passages, each wide enough for only one person.

On the new Berlin Elevated cars the attempt has been made to grapple with this problem by setting the seats back on each side of the entrances. In the old cars, the door was 45 in. wide and the spacing between the seats adjoining the door entrance was 55 in. This distance has now been increased to 79 in., so that one standing passenger on each side of the door leaves an opening at least equal to that of the door. To accommodate this change, the cars are made $3\frac{1}{2}$ in. longer. The number of low partitions, or arm rests, between seats and the number of stanchions used for handholds has been increased in the new type of car. One of the stanchions in the new design of car is set opposite the entrance in the middle of the car.

As shown in the accompanying illustrations, there is a folding seat at each end of the car and no passageway between the cars of a train. More distinct coloring to distinguish the cars of the two classes operated has also been adopted in the new car.

The News of the Industry

Plans for Increased Travel

Georgia Company Announces New Car Purchases and Bus Extensions Following Ouster of Jitneys

With the signing of the new ordinance barring jitneys from competing with street cars in Atlanta, Ga., plans are being made by the Georgia Railway & Power Company to meet the increased travel which is expected on March 8 and thereafter when the jitneys will have ceased operation. The company announced on Feb. 9 that it had placed orders for the immediate delivery of 20 new, large and modern street cars, which will be put into operation as the jitneys cease to run. According to officials of the company, the elimination of the jitney is only the first step in solving the city's transportation problem, and it is ready to do its full share in putting the Beeler recommendations into effect. They stated that the company was willing to confer with city officials as to the best manner of handling the situation and would co-operate with the city in every possible way.

As one of the first steps in this direction it is indicated that at least two bus lines will be established in the near future by the company to supplement its railway system and serve sections of the city not as yet reached by any street car line. In fact, on Feb. 12 the company petitioned the City Council for the right to operate buses over two designated routes. One route is through the Peachtree-Morningside district of the city and the other through the Boulevard Park-Highland Avenue districts, both of which are at present inadequately supplied with street car service.

While it is not yet known what type of bus will be selected, or exactly how much money will be spent upon the auxiliary bus system, it is understood that at least 15 20-passenger buses will be ordered by the company and that several hundred thousand dollars will be invested by the company in buses, garages and shop facilities for carrying on this line of work.

The routes selected for the first two lines are, with a few minor changes, those pointed out by the Beeler report, and stopping places will be indicated by neat coach stop signs similar to the car stop signs now in use.

In asking for permission to operate the two coach lines, the company points out that a heavy initial investment will be required to start operation, that the lines will have to be operated at a loss for at least a year while patronage is being built up and that the investment will be justified only if the company is given the exclusive use of the two routes.

The fare on the new bus lines will be the same as that charged on the

street cars, it is understood, and if the trade develops properly and the experiment is a success other buses will be added to the equipment of the company and other routes added to supplement the street car system.

Entrance of the Georgia Railway & Power Company into the bus field has been under consideration for some time and awaits now only the approval of the City Council. The company states that it is "deeply appreciative of the action of the City Council in voting for the elimination of unregulated jitney competition with the street railroad"

and that it will work toward a definite solution of the city's transportation problem.

Maine Central to Study Electrification

Murray & Flood, consulting engineers, New York, have been retained by the Maine Central Railroad to investigate and report to President McDonald within six months upon the cost and feasibility of electrifying the main line of the company from Portland to Bangor, including various related yards.

Electrification Goes Ahead

Review of Work on Roads Out of New York City Under Jurisdiction of State Utilities Commission—Work on Long Island Road's Babylon Line to Be Finished on Time

RAPID progress is being made by the Long Island Railroad in electrifying that portion of its line now operated by steam from Valley Stream and Jamaica to Babylon, a distance of more than 25 miles. In fact the progress made so far indicates that the schedule will probably be met which called for the work to be finished by May 1, 1925.

It is planned to rehabilitate the old Central Extension branch from Bethpage Junction to Babylon, so that it may be placed in operation and thus relieve the electrified section of the heavy summer traffic to the Hamptons and the South Shore of the east end of the Island as well as furnish better service to daily patrons east of Babylon.

At present there remains only 15 per cent of the work planned to complete electric operation to Babylon; 36 miles out of 53.25 miles of third rail has been laid; 16.7 miles out of 18.6 miles of a new high-tension transmission line extending from Lynbrook to Babylon has been completed; the rebuilding of an existing pole line from Rockaway Junction to Valley Stream to permit transmission at 33,000 volts instead of 11,000 is about 10 per cent completed. There remains to be undertaken pole line work between Valley Stream and Cedarhurst and the installation of an additional feeder between Dunton and Rockaway Junction. A new duct system from White Pot to Dunton, 16,495 ft. in length, has been completed. Substation buildings at Laurelton, Freeport, Wantagh and Babylon have been completed. Those at Amityville and Lynbrook are about 75 per cent completed. Equipment has been installed at Babylon and Wantagh.

This is only one of the pieces of electrification work going on under the jurisdiction of the Public Service Commission of New York. Hearings are in progress upon the petitions filed in connection with the electrification of the Yonkers branch, that portion of the

Putnam division in the city of Yonkers, and the Port Morris branch of the New York Central Railroad. An order has been adopted approving the petition of the New York Connecting Railroad to complete the electrification of its railroad in the Borough of Queens. A determination was reached early in 1924 in the matter of the electrification of the Staten Island Rapid Transit Railway and the Staten Island Railroad.

PROGRESS ON STATEN ISLAND WORK

This project is now well under way, approximately 70 per cent of the scheduled work having been completed. A contract has been made by the railroad with the Staten Island Edison Corporation under which the latter will furnish the energy to be used. This required extensive additions to plant by the Edison Corporation, about 40 per cent of which has been completed. It is now expected that electric operation upon Staten Island will be begun about Nov. 1, 1925.

About 90 per cent of all of the work required to relay the main running tracks with 100-lb. rail has been completed, 65 per cent of the necessary third rail ties has been installed, 35 per cent of the third rail has been distributed, bonding, preliminary signal installation work, platform changes and other work are progressing rapidly. Plans for all of the necessary substations are completed and all of the material with which to equip them has been ordered. Orders have been placed for 80 multiple-unit cars to be operated upon the railroad. The Staten Island Edison Corporation has made an effective start in necessary changes at its power plant.

The most important and extensive change from steam to electrical service contemplated under the so-called Kaufmann act is the change to be made by the New York Central Company in its operation on the west side of New York City. The railroad filed a petition to

substitute electricity for the present steam motive power. Hearings were promptly undertaken jointly by the Public Service Commission and the Transit Commission of the State of New York. It very early developed in these hearings, however, that the change from steam power to electric power could not be undertaken until arrangements were made not only for the necessary grade crossing changes but also for the essential relocation of a considerable portion of the railroad's line on the west side of New York. These matters are not under the jurisdiction of the Public Service Commission. It is the understanding of the Public Service Commission that they are under consideration by the authorities of the city of New York and the railroad and within the last month some three grade crossing changes were ordered by the State Transit Commission.

\$100,000 Bus Plan for Suburban Rochester

The Rochester Co-ordinated Bus Lines, subsidiary of the New York State Railways, Rochester Lines, has announced plans for a network of bus lines through the towns of Greece, Parma, Hilton and places along Lake Ontario between Charlotte and Manitou Beach, provided the Rochester-Manitou Railway's petition to discontinue its line is granted by the Public Service Commission. The lines planned by the railway will entail an expenditure of at least \$100,000.

The Manitou line, a 9-mile railway, operates only during the summer and serves lake shore colonies. The railway now plans year-round bus service. Plans are being discussed for turning the roadbed into a highway, but operation of the bus service by the railway is not contingent upon this.

The fight is still on between the railways and the Ridge Road bus line. The Council granted the Ridge line permission to operate its buses into the Broad Street terminal in Rochester, but barred their taking passengers within the city limits. The railways countered with an application to open a bus service over the Ridge Road. The town of Greece has granted this permission and the matter is before the Public Service Commission. The move will be fought by the New York State Auto Bus Association, of which James J. Dadd, Rochester, is secretary.

The New York State Railways, through its subsidiary, operates the East Avenue bus line, the Dewey Avenue feeder line and a crosstown trackless trolley line. The new plans indicate its intention to enter the bus business on a wide scale, based on the success of its experiments to date.

The petition to the commission asking permission to abandon the Rochester-Manitou line sets forth that in 1922 the net loss was \$5,809; in 1923 it was \$7,371 and in 1924 \$12,815. The petition shows that the company has a deficit of \$25,882, with cash on hand of only 50 cents, and miscellaneous accounts receivable of only \$10, whereas it owed \$12,607, besides its funded debt of \$85,000 principal and \$1,808 accrued interest.

Commission Blameless, But Needless

Governor Smith Runs with the Hares but Holds with the Hounds on New York Situation

Governor Smith of New York recommends the abolition of the present Transit Commission and the transfer of its duties and powers to the Board of Transportation of New York City. This he did in a message sent to the Legislature on Feb. 16 in which he reviews the investigation conducted by Supreme Court Justice John V. McAvoy into transit matters in the city of New York and quotes at length from his report.

Touching upon the bus situation, the Governor in his message said:

Illegal operation of buses is against the law and nobody can defend it. A municipality should not be above the law any more than an individual. While this report makes no definite recommendations as to legislation, I call your attention to my annual messages of 1923, 1924 and 1925 and special messages dealing with this subject, in which I have repeatedly urged that all the cities of the State be given the right to own and operate bus lines.

Reference is also made by the Governor to that part of the report of Justice McAvoy in which the justice said:

The proof presented with respect to the charges filed by the Board of Estimate and Apportionment against the Transit Commissioners shows that the charges are without foundation and that no cause exists for the removal from office of the Commissioners.

In his comment on this the Governor said:

I approve this conclusion. There is, however, a sharp distinction between the removal from office of individual commissioners upon charges of misconduct and the abolition of a commission itself as an agency of government. After removal upon charges the obligation would still rest upon the Governor to appoint successors to the office. I have held continuously since 1923 that there is no need for such an agency of government as the Transit Commission. Its existence in the city of New York has given rise to a division of responsibility in the past with respect to transit matters.

In 1923 and 1924 the Governor recommended the abolition of the Transit Commission and stated that in his belief its powers could be lodged in the municipality. Since that time the power to construct new subways has been taken from the Transit Commission and placed in the Board of Transportation of New York City, but all other powers remain as before in the Transit Commission. He is still of the opinion that the Transit Commission should be abolished. He said:

The deplorable transit conditions in New York are admitted by everybody. The immediate question, therefore, is relief, and relief at the earliest possible moment for the millions of people who live in the city of New York. I urge upon the Legislature to study the constructive recommendations of this report and by following the recommendations herein contained to make its contribution to the health, happiness and comfort of the people of the largest city in the country.

Meanwhile, Senator James A. Higgins has introduced a bill calling for a referendum on municipal operation of subways and a 5-cent fare. A second new bill, offered by Senator Thomas F. Burchill, demands that the Interborough, B.-M. T. and all other railroad companies in the metropolis replace wooden cars with steel ones within a year. This is direct repudiation of Justice McAvoy's findings, which declared wooden cars safe.

Four bills have been introduced in the New York Legislature which seek

to afford legal aid to operation of motor buses. One of the measures would authorize street surface railroads to exercise all powers conferred by law upon a stage coach corporation. At the present time it is necessary for an electric railway wishing to operate a bus line to do so through a holding company. Another measure would amend the railroad law by authorizing the Public Service Commission to permit a street surface railway to substitute a stage route, bus or motor vehicle route in place of any part of its railroad. Still another bill would amend section 22 of the transportation corporation law by empowering stage coach corporations to own, maintain and operate automobiles and other vehicles for transporting persons for hire, including sightseeing trips. The fourth bill would add a new section to the transportation corporations law authorizing the Public Service Commission to grant a stage coach corporation a certificate for operating a through route, in length 100 miles or more in one general direction, without the consent of local authorities.

Service Cuts in Buffalo—Mayor's Baiting Tactics Harmful

Service on five local lines of the International Railway in Buffalo, N. Y., will be abandoned on Feb. 22 and schedules on various other lines will be materially curtailed as the result of increased operating deficits. Every possible economy will be made.

On Feb. 15 the company placed one-man cars in operation on the Seneca Street and South Park lines, two of the heaviest patronized lines in the city, and on Feb. 22 the use of one-man cars will be extended to three other local lines. One-man cars will soon be in service on practically all the local lines in Buffalo where near-side pay-enter cars are in operation. This economy in operation is expected to save the railway upward of \$700,000 annually.

Mayor Frank X. Schwab announced he would declare an emergency existed and would issue permits for the operation of jitneys as soon as the railway abandoned service on its local lines.

Criticism of the attitude of the Mayor in his handling of the traction problem is voiced by Herbert G. Tulley, president of the International Railway, in the current issue of "Tulley Talks," distributed by the railway to car riders. Mr. Tulley said in part:

Encouraging the strikers, who had under a previous management tied up every street car in Buffalo in order to enforce the immediate payment of increased wages, was certainly the wrong way to go about reducing the company's operating costs so as to help it to keep the 5-cent fare. Encouraging jitneys to rob the company of its most profitable short riding, as was done, and the delaying of bus consents to the international for so long a period, had also a very bad effect. The city should have granted the company the right to operate and then helped us to keep fares down, as well as costs, which must always be paid from fares.

The Mayor's New Year greeting contained the words, "Small-town criticism has no place in the city of Buffalo, and a resolution that should be made by all of us might be, 'Here's where I live. I will boost Buffalo in 1925.'" I. R. C. men and management would gladly give the goodby to "small-town criticism" and help the Mayor keep his 1925 resolution, so that car riders may benefit from city-company co-operation in a measure comparable with the possibilities already shown by co-operation of men and management.

Board Recommends Service Improvements in Trenton

The Board of Public Utility Commissioners of New Jersey recently submitted a report outlining the results of an investigation into the trolley service in Trenton. The suggestions for improving the service were applicable to the Trenton & Mercer County Traction Corporation and also to the regulation of traffic by the city authorities. The commission felt that one of the principal sources of complaint was irregular headway. It recommended the use of more men to supervise operation of cars. It also recommended that car platforms should be reconstructed to facilitate speedy loading and unloading. As another remedial measure the board recommended additional layovers at the various terminals to permit the absorption of delays in normal running schedules. It urged additional facilities for turning back cars where there had been unusual breaks in the headway.

So far as the City Commissioners were concerned the board recommended further regulation of traffic by the elimination of parking in the center of the city between certain streets, at least during the peak traffic hours, and the further diversion of motor vehicle traffic from the more congested thoroughfares upon which the trolleys were operated. In making its recommendations the board said that it was mindful of the difficulties of the situation because of the narrow streets and the tremendous growth in automobile traffic. It believed that service could be improved by co-operation between the City Commission and the company.

Bus Bill in Massachusetts Provokes Discussion

Representatives of the bus lines in Massachusetts resent the thought of being placed under control of the Massachusetts Department of Public Utilities. This they made plain in their fight against a bill to regulate them, filed by Clinton Q. Richmond, president of the Berkshire Street Railway, when the matter was discussed by the joint legislative committee on street railways. Mr. Richmond would require bus lines to secure a certificate of convenience and necessity from the Department of Public Utilities in addition to the permission of local authorities in communities in which they plan to run. The department would be permitted to refuse or recall the license and indicate the route.

Day Baker, who represents the bus owners, contends the only dispute between the railways and the bus owners is over the question of the proper board of regulation. He says that the Department of Public Works is best qualified to have jurisdiction. He has a bill that would make the Public Works Department the sole authority to license operations when the routes extend beyond any city or town. Mr. Baker said that at present one city or town may hold up the entire operation by refusing permission to pass through that particular locality.

James M. Swift, counsel for the Motor Coach Association of New England, is supporting the Baker bill.

W. F. Smith of the Royal Blue Line, George E. Marsters of the Marsters Tours, B. L. Thomas of the Sightseeing Tours and Harry J. Dooley of the Gray Line Auto Tours also are in favor of the Baker bill.

2,000,000 Bus-Miles in Detroit

The Department of Street Railways in the City of Detroit is installing another bus line to have a length of 3.8 miles, making the eighth coach line for the motor coach division to operate. This line will extend from the terminal of the Fort Street car line at the West Jefferson carhouse to State and Fort Streets in the village of Lincoln Park. According to Ross Schram, general manager of the D. S. R., the city will operate over 2,000,000 coach-miles this year. Six coach lines were started in the month of January with a total of 23 miles and 250,000 fares were collected during that month. It is anticipated that within 30 days the D. S. R. will be collecting 350,000 bus fares monthly.

The line on West Fort Street will exhaust the last of the 50 single-deck buses rented from Dodge Brothers. More buses are to be requested from the Council and it is also planned to build two service garages, one for the east side and one for the west side of the city, to care for the buses.

Operators of the city buses are obtained largely from among the D. S. R. platform men. The D. S. R. motor coach division is expanding so fast that difficulty is found by the department in keeping up with the demand for revision of running schedule. Maps have been prepared by H. M. Gould, assistant general manager, and Frank Pepler, superintendent of the division, showing the location of all the coach lines. Patrons of the line are supplied with copies of these maps and also with time schedules. Criticisms or suggestions in regard to the service are solicited from the patrons.

Accidents Decreased 23 per Cent

One year of an intensive accident campaign on the Chicago Surface Lines has resulted in a reduction of 23 per cent in fatalities. All accidents, regardless of responsibility, are included in the figures, which will be published in advertisements in Chicago newspapers. The campaign was conducted by Victor T. Noonan, who addressed 100 group meetings in 1924. The statement "Saving Lives," follows:

There was a reduction of 23 per cent in the number of fatal accidents on the Chicago Surface Lines last year as compared with 1923.

This was achieved despite the fact that a hundred more cars were in operation and several hundred more men were employed on the system last year, and at least 50,000 more automobiles were on the streets.

It is a direct result of careful organization in the interest of public safety.

A general advisory council composed of company officials meets with the company's accident prevention engineer at regular intervals to determine safe policies.

Employees' councils study accident prevention and report unsafe practices and conditions to the accident prevention engineer and the general advisory council.

One hundred group meetings of employees were held last year for the purpose of discussing safety.

Thus every individual is brought to realize his personal responsibility for the comfort and safety of others.

Every week is safety week on the Surface Lines.

Ottawa Revenue Loss Charged to Bus Competition

The Ottawa Electric Railway, Ottawa, Ont., says that the operation of bus lines is largely responsible for the receipts of the company falling \$109,484 below the estimate for last year as made in the Feustel report. This contention was made by the company in a letter to the special street railway committee, which met recently. The company claims that the bus lines are breaking the law by carrying passengers from one point to another within the city limits. The company asked the city to co-operate in securing legislation to prevent the bus lines operating within the city. The committee agreed to the company's plea for special legislation and also agreed to co-operate with the company in an application for increased borrowing powers.

The company now has power to borrow on bonds up to \$1,000,000 for construction work. It wants to borrow up to 75 per cent of its assets if necessary. The committee agreed to recommend that the company be allowed to defer the construction of the extension from Queen Street along Lyon to Gladstone. This was to be done this year, but the company points out that the extension is not warranted by the receipts. Major F. D. Burpee, vice-president and manager, said that the company was prepared to carry out other extensions in the second year's program. There was no objection to the company's proposal that 40 double-truck or large cars should be built within the next 2 years instead of 27 large and 20 small cars in 5 years.

Suggests Relief for Tacoma Property

Recommendations have been made which favor the granting of certain concessions to the Tacoma Railway & Power Company, Tacoma, Wash., in the matter of paving requirements, the hauling of city employees and direct competition by buses, on the basis of a 2-year experiment, without abrogation of existing franchises. The suggestions were contained in the report of the committee on transportation of the Federation of Improvement Clubs recently submitted to the City Council. The committee suggested that the company be relieved of paying payments except to the extent to which the cost of paving is increased by reason of the presence of the street car tracks, but asserted that maintenance of paving between tracks should continue as an obligation of the company. It suggested the regulation of buses by requiring them to run on other streets than those with car tracks and requiring a tax from them. It also favored the abolition of free rides for city employees except policemen on duty, and expressed the belief that for such concessions the street car company should be willing to extend service to present unserved sections. Admitting that a gross earnings tax on a corporation shown to be losing money is probably unjust, the committee said that relief from this tax should be a last resort. The report finally urged greater co-operation between the city and the railway.

St. Louis & Kansas Line Seeks Certificate

Incorporators of the proposed short line electric railway between St. Louis and Kansas City, Mo., appeared before the Missouri Public Service Commission at Jefferson City on Feb. 11. They are seeking a certificate of convenience and necessity to operate the line, but announced they were not ready to make a detailed showing of the financial backing of the new venture unless the members of the commission absolutely insisted upon it. The commissioners did not press the point at this time and the hearing was adjourned until March 5.

Lee Dunlap, Kansas City, vice-president of the new road, which will be known as the St. Louis-Kansas City Short Line Railroad Company, and S. J. McWilliams, Kansas City, counsel for the road, appeared for the road, but did not go into its finances except to say that bonds probably would be sold to defray part of the cost. The other incorporators of the road, which was granted a charter on Nov. 28, 1924, are Frank E. Lott, Kansas City; Ernest H. Lawton, Erba D. Smith and William H. White, St. Joseph. When the charter was issued it was stated \$240,000 in stock had been subscribed of the total capital stock of \$2,400,000.

At the hearing on Feb. 11 Mr. Dunlap stated that virtually all the needed right-of-way across the State had been obtained. The proposed line extends from University City, Mo., to Kansas City, a distance of 238 miles. The principal towns that will be served are: St. Charles, Warrenton, Columbia, New Franklin, Marshall, Higginsville and Independence. The road will construct two bridges across the Missouri River, at Creve Cœur and Arrow Rock.

Charles G. Miller, Kansas City, attorney for the Chicago & Alton, the tracks of which will be paralleled half way across the State, was the chief inquisitor for the steam railroads. H. H. Larimore of the Missouri Pacific and H. J. Nelson of St. Joseph, representing the Burlington, protested that before the road was authorized to sell stocks or bonds it should be made to prove its financial responsibility.

It has been estimated the road will cost \$26,000,000 for construction and equipment. The new road will parallel the Wabash from St. Charles to High Hill and the Chicago & Alton from Marshall to Kansas City. This project was referred to previously in the *ELECTRIC RAILWAY JOURNAL*.

P.R.T. Puts Into Operation First Loading Platform

The first trolley car loading platform for passengers to be operated in Philadelphia, Pa., was installed alongside the westbound trolley tracks on Market Street, at 12th, on Feb. 8, and immediately placed in use. The platform was built and installed by the Philadelphia Rapid Transit Company at the request of the Highway Bureau. The Council appropriated \$15,000 to pay for the construction and installation of a number of the platforms as a measure to protect car riders from automobiles while waiting for cars,

and the Highway Bureau of the Department of Public Works was authorized to proceed with the project. After consulting with the P.R.T., Highway Bureau officials found that the company could construct and place in position the platforms more economically than the city could do it and it was arranged for the company to do so.

The platforms are built in sections 21 ft. long, which may be joined, end to end, so that a platform of any length desired may be placed at a car stop. They are 5 ft. wide and 6 in. high. Iron uprights, along the tops of which a chain is strung, are placed at intervals of several feet along the side of the platform toward the curb, so that passengers waiting for cars are fully protected from automobile traffic.

If the operation of this platform is successful others will be placed throughout the city at points where traffic is heavy.

Seeks 8-Cent Fare in La Crosse

Confronted by an unsatisfactory operating condition which could only be eliminated by higher fares and lower operating costs if it is to continue its business along profitable lines, the Wisconsin Railway, Light & Power Company has filed with the Wisconsin Railroad Commission a petition asking for an increase in fares in La Crosse from 7 to 8 cents. The company also seeks to abolish three cut-rate privileges covering eight tickets for 50 cents, the monthly commutation tickets of 50 for \$2.75, and books of 20 tickets for \$1 to school children. For these it would substitute a book containing seven tickets for 50 cents. Permission is also sought to use one-man cars on the north side line.

R. M. Howard, vice-president and general manager of the company, explained that in 1924 and previous years the company was unable to earn the usual return allowed by law on its investment. Responsibility for this condition was attributed to paying expenses of \$50,000 in 1923 and 1924 and increased use of the automobile.

Suggests Fellow Workers on Board in Detroit

Ross Schram, general manager of the Detroit Department of Street Railways, has made a proposal that its platform employees nominate a group to act in place of the trial board to discipline fellow employees. At present the board is composed of Department heads. The proposal was made to Neil McLellan, secretary of the street car men's union, in answer to a protest against what Mr. McLellan said was an encouragement by the department of complaints from the street car riders.

It was announced that criticism would be welcomed by the head of the department as in the past, but there was no objection to having the men select a group from among their own number to judge the fairness of the complaints. The management will assume the roll of prosecutor in the trials of employees accused. If such a plan is favored by the men or if another

plan is advanced by them it will be given a month's trial to determine whether or not it fits in with the policy of the department for improving service to the public by giving the men added responsibilities.

Wisconsin Commission Sanctions Extensions

The Railroad Commission of Wisconsin has voted two to one to grant a certificate of public necessity and convenience to the Milwaukee Electric Railway & Light Company to build an electric railway 3.49 miles long for freight-hauling purposes from its Lake-side power plant west through the town of Lake to the freight lines of the Chicago & Northwestern Railroad, and another line 8 miles from Clement Avenue paralleling the Chicago, Milwaukee & St. Paul line to a point 1½ miles south of South Milwaukee, where it will join the Racine interurban line.

The company sought the right to build the first-mentioned line in order to insure an adequate and unfailing supply of coal for the power plant and a right-of-way for a transmission line.

The route from Clement Avenue is to be used as a cut-off for through passenger trains on the Racine interurban line.

Commissioners Gettle and MacDonald point out that the route recommended by the Public Land Commission is about a mile south of the one petitioned for by the company, but that under the law the company has a mile wide margin within which it can build its tracks, and the route proposed by the objectors is within the mile area. They also point out that about \$175,000 has already been spent on the proposed route and that the plea on behalf of future zoning regulations could not be considered, as the commission cannot take into account what may happen later.

In dissenting on practically all points, Commissioner Kanneberg denied there would be any increased construction and operating costs and held that the law permitting change of route applies only to open country and not to a line in a town, village or city, although not incorporated. He also maintained that co-operation in zoning and other plans to aid in city planning activity must be considered by the commission.

Contract Legal if Approved

The city attorney of Milwaukee, Wis., has ruled that if the Common Council and the voters approved of the proposed service-at-cost agreement now being negotiated between the Milwaukee Electric Railway & Light Company and the city it would be legal, especially if the city and company entered into the arrangement voluntarily. He gave this opinion following the threatened plan of certain Milwaukee business men to invalidate the contract by legal action on the ground that the 1900 franchise was still effective. The city attorney explained that the company was now operating under the indeterminate permit law which superseded the franchise granted to the company in 1900.

Student Rates Unfair and Hard to Collect, Says P. R. T.

The Philadelphia Rapid Transit Company, Philadelphia, Pa., believes that a reduction in fare for high school students would be both discriminatory and uneconomical. This is the substance of its answer to the students' associations of the high schools of the city, who petitioned recently for special reduced rates for high school students. The company said that it was in sympathy with the large number of students who were doing part time work in order to defray the expenses of their education, but that it would not be fair to extend to them a privilege which it would be impossible to give to the many thousands of young women whose financial condition was such that even a part time working plan would not enable them to secure a high school education. To the argument of the association that many cities do provide a special fare for students, the company said that in practically all cities where the privilege existed it had been inherited from early days when original franchise grants included this and other provisions based on other considerations than the cost of service. Experience and observation of the Philadelphia management had indicated that the practice, involved so great a cost in collection as to eclipse any added revenue brought by increased riding.

The company stated that fare reduction for such of the high school students as were short riders must await completion of the Broad Street subway, at which time the company would advocate a 5-cent fare for the full length of all high-speed lines and a 5-cent zone system on surface cars.

Buses Affect Revenue of Dallas-Denton Line

Bus competition is affecting the revenue of the new interurban electric line of the Texas Interurban Company between Dallas and Denton, but the company has taken no action looking to a curtailment of service. Earnings of the Texas Interurban Company, which operates both the Terrell and Denton lines, failed to meet interest charges on its investment during January, but the loss was all on the Denton line.

The Terrell and Denton lines were built by the company in fulfillment of a commitment made when the railway franchise was granted to C. W. Hobson and associates in 1917.

Stations Lengthened in Brooklyn to Increase Capacity

In order to provide for the better accommodation of passengers by longer trains, the New York Transit Commission has formally directed the lengthening of all of the stations on the main line of the Fourth Avenue subway in Brooklyn. The commission has initiated the project with a request that the Board of Transportation make the necessary plans and supervise construction after an appropriation is obtained from the Board of Estimate and Apportionment. Eight-car trains in-

stead of the present seven-car trains will be made possible.

The additional station-lengthening program includes the local stations south of Pacific Street to the end of the existing line at 86th Street. An extension of the Fourth Avenue line is under construction from 86th to 95th Street, Fort Hamilton, but the lengthening of the terminal station at the latter point, the only station upon the extension, will be taken care of during construction.

All will be lengthened to a full 530 ft. At present they are principally 435 ft. long, those more recently constructed being 485 ft. long.

For the fiscal year ended June 30 last the Fourth Avenue line carried 57,838,316 passengers, as against 52,193,641 in the preceding similar annual period.

Railway Expands Bus Lines in St. Louis

The West Florissant-Jennings, Mo., line of the St. Louis Bus Company, auxiliary of the United Railways, St. Louis, Mo., has proved a financial success and the company has placed orders for several additional buses to be used on the line. The Natural Bridge Avenue line is also beginning to make a little money. Patronage is building up very nicely and more buses will be added soon. On the West Florissant and Jennings line a branch leaves West Florissant Avenue at Helen Avenue and runs to Melrose Avenue. Eight White buses will eventually be used on this installation. For a time temporary equipment obtained from other bus companies was used in this service. When the St. Louis-Jennings Electric Railway was abandoned a few years ago the residents of Jennings and West Walnut Manor were left without adequate transportation, and the new bus line with transfer privileges to all the city street car lines proved welcome.

The acquisition of the St. Louis Bus Company by the United Railways has presented no insurmountable shop problems for the latter company. Prior to the opening of the bus lines the United Railways had large and strictly modern garage and automobile repair shops for its fleet of automobile repair trucks, track department vehicles and automobiles used by officials of the company. The 12 buses now in operation on the Natural Bridge Avenue and the West Florissant Avenue-Jennings-Helen Avenue lines are being housed in the general garage on Thirty-ninth Street just north of Park Avenue, near the general offices of the railway. The automobile repair shops adjoin the garage. The shops are equipped with the very latest machinery and machine tools for rebuilding and repairing automobiles and gasoline engines. The mechanics are specialists in auto work and at all times 18 or 20 boys from the various shop departments are students at the David Rankin, Jr., School of Mechanical Trades. While they are attending the school the boys are paid a minimum of 25 cents an hour, with an increase of 3 cents an hour every six months. When the boys finish their course they are given positions in the shops organization at the full wage of journeymen mechanics.

Exemption Ordinances Not Considered

Ordinances which would exempt the East St. Louis & Suburban Railway, East St. Louis, Ill., from obligations incurred under a franchise which recently expired failed to come up for final vote before the City Council at its meeting on Feb. 9. The Council had previously accepted an agreement with the company and approved a resolution to submit the ordinances to the people.

Michael J. Whalen, City Commissioner, has led the fight against the three ordinances which would exempt the railway from paving between its tracks on North Seventh Street and permitting the abandonment of services on other streets. He objected to a section in one of the ordinances which provided that the company should pay an annual tax of \$25 a car, the number of cars to be based on an 18-hour unit of operation a day. The former franchise provided for the payment of \$25 a year on each car operated.

At a caucus of the Council on Feb. 10 W. H. Sawyer, president of the railway, presented a certified copy of a resolution passed by Council on Aug. 5, 1913, which stated that in the absence of a definite method of calculating the number of cars operated by the company the fee provided for should be based on the number of cars in an 18-hour operating unit a day.

Buses Supplement Topeka Street Cars

New buses to serve as street cars for the outlying districts will be put in service by the Topeka Railway in the near future. Several of the buses have already arrived and are going through the paint shop. They will resemble the street cars in color and interior arrangement, each car seating 25. Passengers will enter and leave by the front entrance, but a rear door has been added for emergency use. The routes have not yet been mapped out. They will not be stub lines, but will run all the way downtown. Transfers will be interchanged between the buses and the street cars.

Bus Extensions in Oakland Announced

The Key System Transit Company will shortly begin the operation of four more bus lines in Oakland, Cal. This will bring the number of bus lines operated by the company in the East Bay cities up to ten. These bus lines have been installed as the result of the recent traffic survey and routed in sections that have grown to a point where more transportation has become vital.

In making public announcement of the new lines, the company said that all 10 motor bus services now in operation or arranged for would be continued, if the loss was not too great. The company said: "We ask your regular patronage in order that these services may be maintained and extended. All are now operated at a loss, some at an unjustifiable loss." The new buses are expected to be ready for operation by March 1.

News Notes

Substitute Plan for Pittsburgh.—Car looping in Pittsburgh, Pa., was postponed recently pending trial of a new substitute plan agreed to by traction and downtown interests. Ordinances to bring the new plan to a focus were ordered drawn on Feb. 16 by the Council after a session with representatives of both sides of the controversy, which has been raging for several weeks. One ordinance to be drawn will be a new traffic measure which will add many downtown streets to the "AA" class of streets on which parking will not be permitted between 7.30 a.m. and 6 p.m. The other ordinance entails a franchise for the Pittsburgh Railways in Diamond Street, which would permit the company to create a loop. Mayor Magee indicated that the complete downtown parking regulations was an infringement on the work being done by R. W. Marsh, city traffic engineer. A traffic ordinance following his survey had been prepared, he said, but had been withheld from submission to the Council. He suggested that Mr. Marsh be included in the consultations of the interests and the traffic changes be worked out together.

Buses Succeed Cars.—The Union Traction Company, Santa Cruz, Cal., recently replaced two of its lines in that city with three 25-passenger Mack buses. Santa Cruz is a city of 11,000 population. The railway there has been operating 15 miles of line.

Board Intact.—W. W. Knight has been reappointed by Mayor Brough a member of the Board of Street Railway Control of Toledo, Ohio, for 6 years. The appointment is effective Feb. 1. Mr. Knight has already served a term of 4 years on the board and in the last 2 years has acted as chairman of the group. The reappointment of Mr. Knight will keep the membership intact. Other members are H. C. Truesdall, who has 4 years to serve, and David H. Goodwillie, who has 2 years yet to serve.

Refuses Higher Bus Fares.—The Public Service Commission has refused to grant the application of the International Railway, Buffalo, for an increase in bus fares on the Bailey Avenue line from 7 cents to 10 cents to make them uniform with the Delaware and Delavan Avenue bus lines. The company claimed it is losing \$2,000 weekly on the Bailey Avenue bus route. This line is being operated at the same rate of fare as the street cars—7 cents or four tokens for 25 cents, with free transfers to connecting car lines. The company will abandon its Bailey Avenue car line between Broadway and East Seneca Streets on Feb. 22 along with four other local lines.

Bus Permit Granted.—The East St. Louis & Suburban Railway, East St. Louis, Ill., has been granted a permit to operate buses over the St. Louis Municipal Bridge and to loop around the downtown St. Louis business section. The permit was granted by the

Board of Public Service of St. Louis on Feb. 13. The permit fixes the maximum fare at 10 cents. The East St. Louis & Suburban has also applied to the Illinois Commerce Commission for a certificate of convenience and necessity to operate motor express trucks in St. Louis and National City, Edwardsville, Collinsville, Shiloh, Fairmount City, Brooklyn, Madison, Alton, Venice, Hartford, Granite City, Maryville, Woodriver, East Alton, Lebanon, O'Fallon, Belleville and East St. Louis. W. H. Sawyer, president of the company, stated that the express trucks will supplement the present interurban freight and express service.

Experimental Bus Service in Ann Arbor.—Under the terms of the service-at-cost agreement with the city of Ann Arbor, Mich., the People's Motor Coach Company, which is affiliated with the Detroit United Railway, started bus service in Ann Arbor recently. The 5-cent trolley lines, which serve only a small part of the city of Ann Arbor, have been succeeded by a bus system of much greater route mileage and vehicle mileage at the following fare schedules: 10 cents cash, 8½-cent token, 50 rides for \$3 on a punch card, and \$1.25 weekly pass. The agreement permits the return to railway service after one year if the results with buses are not mutually satisfactory.

Commission Vacancies to Be Filled.—R. H. Musser, Plattsburg, Mo., one of the two Democratic members of the Missouri Public Service Commission, has announced his intention of resigning not later than March 1. His term expires April 15. The term of E. J. Bean, De Soto, the other Democrat, also expires April 15. Governor Baker will be urged to select engineers from St. Louis and Kansas City to succeed Messrs. Musser and Bean as the two major cities of the state at present are without representation on this important board despite the vast public utilities centered in those cities.

Joint Interurban and Bus Service.—An arrangement has been made between the Toledo & Indiana Railway and the Fort Wayne-Toledo Transportation Company to operate a joint service between Toledo and Fort Wayne, Ind., effective Feb. 15. Five trips each way daily will be scheduled. The running time is 4 hours and 10 minutes. The railway cars take passengers as far as Bryan, Ohio. From that point the run is made in buses by way of Hicksville and Harlan to Fort Wayne.

One-Man Car Service Started.—In accordance with authorization granted by the City Council of Macon, Ga., several months ago, the Macon Railway & Light Company recently started one-man street car service on the East Macon-Montpelier Avenue line. All of the old equipment of the company is being converted into one-man street cars. The service will be extended to all other lines as quickly as possible. The reconstruction of the cars was decided upon by the company in working out a plan whereby sufficient money might be saved and be applied to the paving of streets as provided for under the company's agreement with the city. To meet this requirement it became necessary to curtail operating

expenses, L. A. Magraw, general manager, announced.

Will Hear Bus Petition for Niagara Falls.—Application has been made by the International Bus Corporation, a subsidiary of the International Railway, Buffalo, for a franchise to operate de luxe buses in the city of Niagara Falls as part of the proposed Buffalo-Niagara Falls interurban route to be established in the spring. The application of the bus company will be considered by the Niagara Falls City Council at a public hearing on Feb. 23. The company says it would charge a one-way fare of \$1 between Buffalo and Niagara Falls. The fare between LaSalle and Niagara Falls would be 25 cents; Buffalo and Tonawanda or North Tonawanda, 50 cents, and the same fare between the latter two cities and Niagara Falls.

Power Issue to Higher Court.—The case of the Community Traction Company's rate for power against the Toledo Edison Company has been appealed to the Supreme Court of Ohio on error. Both Common Pleas and Appeals Court at Toledo have held against the city's contention that the case is one in which the Public Utilities Commission alone has jurisdiction. Present power rates represent a voluntary reduction from the original rates in effect for nearly 3 years under the Milner ordinance. The rate now is 0.9 cent per kilowatt-hour consumption plus a service charge of \$23,000 a month. The original rate was 1.2 cents a kilowatt-hour. Through court action the city has sought to recover about \$200,000 overcharges during the time the higher rate was in effect.

Railway Wins Cross-Town Bus Permit.—The Public Utilities Commission of the District of Columbia recently authorized the Washington Railway & Electric Company to operate a cross-town bus line between 37th and S Streets and 10th and E Streets, Northwest. The order stipulated that the rate of fare to be charged should be the same as the current rate of fare on street railway lines, except that transfers between cars and buses should be sold at the rate of 2 cents each and will be sold only upon the payment of 8 cents cash fare. The bus line was authorized to start on or before March 1, 1925. The railway company was also authorized to extend its present Potomac Park bus route. At the same time the application of the Washington Rapid Transit Company, which operates in the city of Washington and elsewhere in the District of Columbia independently of the railways, to supply cross-town bus service was rejected.

Insurance Policies Distributed.—For the third year, at Christmas, 1924, the Interstate Public Service Company, Indianapolis, Ind., distributed life insurance policies to employees who had been in the service a year or longer. The total amount of the policies distributed this past Christmas was \$2,191,000 to 1,123 employees. Of this the company paid premiums on \$1,134,600. The employees subscribed for an additional sum of \$956,800, through a special advantageous arrangement made by the Interstate with the company writing the insurance.

Financial and Corporate

\$16,500,000 Atlanta Valuation Figure Questioned

The Georgia Railway & Power Company, Atlanta, Ga., will not accept the Beeler survey figure of \$16,500,000 as the valuation of its railway property for rate-making purposes. This was indicated on Feb. 13 when officials of the company appeared before the special traction committee of the Atlanta City Council to push their contention that the valuation should be \$24,094,708, or approximately \$7,500,000 above the Beeler report figures.

Various evidences of the value of the company's physical properties as listed in the Beeler report are as shown in the following:

- 1. Historical appraisal as of Jan. 1, 1924, \$13,054,004.
- 2. Foregoing adjusted to Jan. 1 price levels, less observed depreciation, \$16,337,206.
- 3. Market value of securities, \$16,164,023.
- 4. Capitalized net earnings under proposed plan of operation, \$15,078,244.
- 5. Reproduction cost new less accrued depreciation, \$16,252,109.
- 6. Reproduction cost new less observed depreciation, \$17,495,581.
- 7. Reproduction cost new less accumulated reserve, \$17,517,544.
- 8. Reproduction cost new, \$19,515,720.
- 9. Reproduction cost new less non-essential construction, \$18,905,102.

The final judgment of the Beeler report was that a valuation of \$16,500,000 should be set upon the property for rate-making purposes.

Preston A. Arkwright, president of the Georgia Railway & Power Company, in asking for a higher valuation of property, said:

The Beeler Organization survey was made before jitneys were barred from the city. It took into consideration all traffic conditions, including jitneys. We think the valuation figure too low and are presenting our side of the question to the City Council, believing the actual physical value of the property to be at least \$24,000,000 instead of the \$16,500,000 given in the Beeler report.

J. L. McLendon, chairman of the special committee considering the seven points of the relief petition of the Georgia Railway & Power Company, stated recently that the committee will meet soon to consider other phases of the petition.

In connection with the valuation matter the Beeler report said that consideration had been given to all evidence tending to determine the original cost of construction of the present plant, the amount and market value of the bonds and stock of the company, the present as compared with the original cost of construction, the probable trend of railway construction costs in the future, the estimated earning capacity of the property under particular rates, the sum required to meet operating expenses, the age and probable useful life of the various items of the property, the exhaustion, wear and tear, obsolescence and inadequacy, the manner in which it has been maintained, the amounts expended for maintenance, the present operating condition of the property and the amounts accumulated on the company's books

in the reserve for renewals and replacements.

It will be recalled that the ordinance virtually eliminating jitney competition with the railway was passed by the City Council and has now been approved by Mayor Sims. In addition to asking elimination of jitneys, other matters suggested in the relief petition of the company are: Increase of cash fares to 10 cents, tickets to be sold at the rate of 6½ cents each; 2 cents charge for transfers; reasonable revision of its operating routes; elimination of unnecessary stops; relief to the extent necessary of all gross receipts tax and relief to the extent necessary of all street paving charges.

Allows Partial Abandonment in Yonkers

The New York Public Service Commission issued an order on Feb. 13 consenting to the abandonment by the Yonkers Railroad of certain of its routes in the city of Yonkers. The commission disapproved the abandonment by the company of the Nepera Park line on Nepperhan Avenue without prejudice to a renewal of that application on changed conditions or further proof. Concerning the claim of the city that sums paid to the Union Railway for use of its tracks for inter-city business were excessive, Commissioner Semple said that he was not convinced that these charges were excessive. He thought the contract fair to the Yonkers company and that if it were deemed fair by the Union Railway its continuance was very much in the public interest in giving convenient access to the station of the Interborough company by the Yonkers people. On the subject of bus applications Commissioner Semple said that he thought the company was entitled to the approval of its declaration of abandonment without regard to any applications either by the company or by other persons for consent of the Yonkers city authorities to the operation of buses on routes which might serve localities now served by the railroad and desired to be abandoned.

Refinancing Plan at Columbus, Ohio, Approved

The \$25,000,000 refinancing plan of the Columbus Railway, Power & Light Company, Columbus, Ohio, as proposed by former President Charles L. Kurtz and amended at a special stockholders' meeting on Jan. 28, was passed by the stockholders at another special meeting held at Columbus on Feb. 10.

The amended plan gives the stockholders 6½ per cent per annum on the series B preferred and in exchange for each share of series B the holder will receive one share of the new and 25 cents. The holder of the present series A preferred will receive for every 100 share 105 of the new series A, which will provide the shareholder an income of 6½ per cent. All preferred stock will lose its voting power and the series B will have a retirement value of 110. Common stock will be exchanged on the basis of two shares for one.

It is pointed out that with the amendments to the Kurtz readjustment plan an additional \$500,000 will be gained by the company.

Following the adoption of the refinancing plan, the stockholders decided to issue 30,000 shares of non-par common stock at \$57.50, subject to the approval of the State Utilities Commission. In putting the new common on the market at 57½ and in giving holders two of the new shares for one of the old, the price of the common stock is kept at 115, the price paid by Cyrus S. Eaton, Cleveland, who recently secured a controlling interest in the Columbus company.

It was estimated that approximately \$9,000,000 will be needed to provide for the growth of the power and light company during the present year. Included in this estimate is the cost of the new power station which is being erected 8 miles south of Columbus at a cost of \$6,000,000. It is expected the new plant will be completed by next fall.

Surplus Increases on New York State Railways

A comparative statement of the earnings and expenses of the New York State Railways, Rochester, for the years ended Dec. 31, 1924 and 1923, was recently submitted by President Hamilton to the stockholders. The report follows:

SUMMARY OF OPERATIONS OF THE NEW YORK STATE RAILWAYS			
	1924	1923	
Railway operating revenues.....	\$10,358,198	\$10,800,517	
Railway operating expenses (including depreciation).....	7,257,744	7,708,178	
Net revenue railway operations.....	\$3,100,453	\$3,092,339	
Net revenue auxiliary operations.....	665	2,482	
Net operating revenue.....	\$3,101,119	\$3,094,821	
Taxes assignable to railway operations.....	711,305	797,121	
Operating income.....	\$2,389,814	\$2,297,699	
Non-operating income.....	125,071	76,868	
Gross income.....	\$2,514,886	\$2,374,568	
Deductions from gross income.....	1,478,478	1,451,177	
Net income.....	\$1,036,407	\$923,391	
Sinking fund appropriations.....	34,636	34,129	
Dividends preferred stock..... (5%)	193,125	(5%) 195,125	
Earned on common stock..... (4.05%)	\$808,645	(3.49%) 696,136	
Dividends common stock.....		(2½%) 448,762	
Surplus.....	\$808,645	\$247,374	

Steady Progress Reported from St. Louis

At the annual meeting of the United Railways, St. Louis, Mo., on Feb. 10 officers were re-elected. The reorganization committee reported the progress of its work to date and the adoption of the plan for the reorganization made public last November. The report of this committee was approved.

One of the next important steps to be taken by the reorganization committee is the securing of a new city franchise. This matter, however, will be permitted to remain dormant until after the municipal election in April. In that way the possibility will be avoided of injecting the franchise matter into the political battle.

A bill of complaint alleging that a number of prominent St. Louisans who have been or are connected with the United Railways as officers or stockholders mismanaged the company and its finances, with a resultant loss to other stockholders, was filed with the United States District Court at St. Louis on Feb. 9 by counsel for John B. Downing and Robert C. Delbridge, stockholders of the company. The bill asks that those complained against be held accountable for any losses the company may have sustained through the alleged mismanagement.

The traffic on the United Railways' lines aside from the Missouri Electric Railway fell off in January compared with the similar month in 1924. The gross receipts for the city lines in January approximated \$1,571,000, against \$1,683,000 in January, 1924. The Missouri Electric showed \$11,000 against \$14,000.

Interurban, Long in Receivership, Now Paying

An offer has been made to the preferred stockholders of the Buffalo & Erie Railway, Buffalo, N. Y., to exchange their preferred stock for the A and B stock of the International Utilities Corporation. The sponsors for the offer are Chandler & Company, New York City. As organizers of the International Utilities Corporation that firm recently took over the bonds of the Buffalo & Lake Erie, with all common stock, and issued 5 per cent preferred stock, amounting to 7,005 shares, in exchange. This preferred would now be exchanged for the shares of International Utilities on the following basis:

Each share of the preferred stock of the Buffalo & Erie Railway will receive one-half share of the Class A stock and one-half share of the Class B stock of International Utilities. The Class A shares are quoted in the market at around 47 and the Class B around 13.

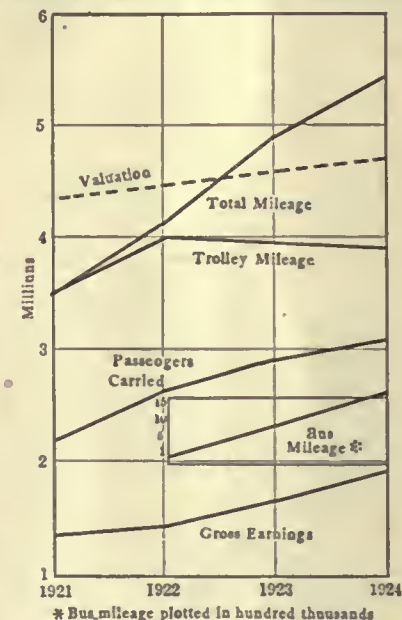
The reorganization agreement that was submitted to the bondholders of the Buffalo & Lake Erie Traction Company, the predecessor of the Buffalo & Erie Railway, which has been in receivership since the bonds went into default in 1912, provided for the organization of two new companies, the Buffalo & Erie Railway and the Erie Railways.

Since taking charge last September, Chandler & Company have not only

improved service on the traction lines, but through the adoption of one-man cars and the application of more intensive methods of selling have put the line on a paying basis. The Buffalo & Erie serve a population of 700,000. It operates 125 miles of track, with 41 miles over private right-of-way.

Youngstown Operates at Profit

For the first time since Jan. 16, 1919, when the service-at-cost franchise of the Youngstown Municipal Railway became effective, has the company shown a profit after paying all costs, and a 7 per cent return on the capital investment. This was in December, 1924. The actual profit was \$187 for the 31-day period. Gross revenue for the month was \$185,413. The operating cost was \$185,413, divided as follows: \$110,819, actual cost of operation;



\$45,435, cost of maintenance; \$1,739, taxes; \$27,418, return on investment.

While the actual surplus was only \$187, the book surplus shows a profit of \$2,575, placed in the stabilizing fund. This difference between the book profit and the actual surplus is the difference between \$5,196 saved on the allowed operating expenses and the \$7,585 expended for road improvements, a difference of \$2,388. When this sum is subtracted from the book balance it gives the \$187 surplus.

In the annual report, Dec. 24 has been marked as the biggest day of the year. This, Christmas eve, showed that 123,000 passengers were transported by the buses and trolleys. For the month of December 479,493 passengers were carried. Earnings per car-mile were 38.70 cents, while the operating costs were 38.66 cents.

For the year there was a deficit of

\$217,041 owing the Pennsylvania-Ohio Power & Light Company, the parent company. This is the difference between the amount allowed under the 7 per cent return ruling and the amount actually paid by the company. The return allowed under the franchise was \$321,584, while the amount paid was \$104,543. This deficit was added to the deficit which has accumulated during the last five years.

Gross revenue for 1924 was \$1,909,908. The cost of operation was \$1,262,388; cost of maintaining the lines, \$447,612; taxes, \$95,364; return on the investment, \$321,584, leaving the deficit \$217,041.

During the four-year period from 1921 to 1924 there has been a steady increase in the gross revenue, mileage traveled and passengers hauled.

Bus service was started in 1922. The valuation of the road has been increased from \$4,406,071 on Dec. 31, 1921, to \$4,760,327 on Dec. 31, 1924.

Sale of Portland Properties to Be Consummated

More than 29,000 shares of stock of the Cumberland County Power & Light Company, Portland, Me., have been deposited in acceptance of the purchase offer of Albert Emanuel Company, New York. Settlement will be made Feb. 16. The purchase price is \$136.50 a share. Of the total of 30,000 shares, 16,000 were owned by E. W. Clark & Company, Philadelphia, and J. & W. Seligman & Company, New York. In accordance with the agreement for sale of these shares a similar offer was made to minority holders. According to the offer the purchasers reserved the right not to consummate the sale unless they secured 25,000 shares.

Reference to the offer of purchase was made in the ELECTRIC RAILWAY JOURNAL for Jan. 31, page 201. Included in the properties is the Portland Railroad, which operates 105 miles of city and suburban railway.

Pensacola Property Taken by Alabama Power Interests

Interests closely affiliated with the Alabama Power Company, Birmingham, Ala., have acquired the Pensacola Electric Company, Pensacola, Fla. Plans are under way for the extension of hydro-electric service from the Alabama company's system in South Alabama to Pensacola and other cities of North Florida.

The effect of the sale of the Pensacola Electric Company, it is believed, will be to make it an operating subsidiary of the Alabama Power Company. The Pensacola company is controlled by Stone & Webster. It operates 25 miles of electric railway. For some time the property has been under the direction of J. G. Holtzclaw as receiver.

TRAFFIC AND MILEAGE STATISTICS OF YOUNGSTOWN MUNICIPAL RAILWAY

Year	Earnings	Passengers	Car-Miles	Bus-Miles	Total Miles
1921.....	\$1,463,352	21,703,998	3,579,532		3,579,532
1922.....	1,491,095	26,337,168	4,010,067	112,901	4,122,968
1923.....	1,707,530	28,807,622	3,979,806	919,557	4,899,364
1924.....	1,909,908	30,526,353	3,885,882	1,511,091	5,396,973

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons there were sold this week 465 shares of collateral trust certificates of the Chicago Elevated Railway, Chicago, Ill., prior preferred participation shares, \$37 lot.

Abandonment Application Turned Down.—The California Railroad Commission has denied the application of the Pacific Electric Railway for permission to suspend operation and remove the tracks of its Brockton Avenue line in Riverside, but has granted permission to the applicant to abandon service on the Seventh Street and Fairmont Park-Victoria Avenue lines. The railway alleged that the traffic did not warrant the expense of maintenance of the service and that the company was faced in the immediate future by the necessity of assuming heavy expense on account of paving. The commission found that the Brockton Avenue line was paying a small return and its abandonment would not be warranted.

Ottawa Electric Pays \$279,075.—The directors of the Ottawa Traction Company, Ottawa, Ont., recently submitted their report for the year ended Dec. 31, 1924. This company owns the Ottawa Electric Railway, which operates the railway system in Ottawa. The amount received from the Ottawa Electric Railway during the year was \$279,075, with which was paid the usual quarterly dividend of 1 per cent and a bonus of 1 per cent. The report states that 20 new pay-as-you-leave cars have been purchased and are now in operation. A great deal of track construction work was completed during the year. A large modern carhouse and repair shop, now under construction in the west end of the city, is expected to be ready for use early this spring.

\$17,650,000 Debentures to Be Retired.—It is announced from Montreal, Que., that the Montreal Tramways will retire \$17,650,000 of its debentures by exchanging them for 30-year general mortgage bonds. The first mortgage bonds, of which \$21,351,000 are outstanding, will be closed at \$25,000,000. Both steps are in connection with the plans to round out the company's financial structure.

Interurban Sold at Auction.—The Columbus, Newark & Zanesville Electric Railway, with headquarters and terminal at Columbus, Ohio, was sold at public auction at Newark, Ohio, on Feb. 3. The property consists of two divisions. The Columbus and Buckeye Lake division brought \$400,000 and the Newark and Zanesville division \$350,000, both figures being the minimum price fixed by the court. Howard C. Johnson bought the first parcel, and John C. Jones the second. Both buyers represent the bondholders. James R. Fitzgibbons, attorney for the company, said that after the reorganization has been effected, plans already made for improving the property would be carried out.

Office and Carhouse Sold.—The terminal and carhouse of the Trenton & Princeton Traction Company at West Hanover and Warren Streets and Chancery Lane, Trenton, N. J., has been sold to William A. Weinmann. Trolley

cars will continue to use the terminal under a lease but the railway will erect an office and carhouse some distance from the center of the city.

Preferred Stock Offered.—A syndicate including Hambleton & Company, Baltimore, Md., is offering at \$96 a share and accrued dividend yielding about 7.30 per cent 15,000 shares of the Southern Power & Light Company's cumulative participating preferred stock, no par value. The Southern Power & Light Company controls by ownership of all of the common stock the Louisiana Power Company, the Louisiana Power & Light Company, the Mississippi Power & Light Company and indirectly, through the Arkansas Light & Power Company, the Pine Bluff Company. The properties of the subsidiaries include 37 miles of electric railway.

Sale of Power Plant Arranged.—The price at which the North Avenue power house in Youngstown, Ohio, is to be returned by the Youngstown Municipal Railway to the Pennsylvania-Ohio Electric Company has been agreed on at \$600,000, the price paid by the city to the P-O when the city took over the plant. The power rate which the Municipal would have to pay the P-O after the station is returned has not been established because the two parties were unable to agree on the efficiency of the Pennsylvania-Ohio company's equipment which must be used in converting the city's power from alternating to direct current. It has been agreed to leave final decision in the matter of conversion equipment in the hands of chief engineers of the Westinghouse Company and the General Electric Company. They will be asked to submit figures on the new equipment such as would be necessary to convert to direct current the amount of alternating current required by the city.

New Directors Elected.—H. B. Voorhees, general manager of the Cincinnati division of the Baltimore & Ohio Railroad and Joseph B. Verkamp, clothing manufacturer, were elected directors of the Ohio Traction Company at the recent annual meeting of the stockholders. They succeed Bayard Kilgour and A. J. Becht, president and secretary respectively of the Cincinnati Street Railway. The Ohio Traction Company is the parent company of the Cincinnati Traction Company, which operates the street railway system in Cincinnati under lease from the Cincinnati Street Railway.

Bonds Being Offered.—The issue of \$2,116,000 of first and refunding mortgage gold bonds of the Worcester Consolidated Street Railway, Worcester, Mass., referred to in the ELECTRIC RAILWAY JOURNAL, issue of Feb. 14, is being offered by Harris, Forbes & Company, Inc., Blodget & Company, Paine, Webber & Company and the Old Colony Trust Company of Boston. The bonds are selling at 97½ and interest to yield 7 per cent. The coupon rate is 6½ per cent. The bonds are dated Aug. 1, 1910, and are due Aug. 1, 1930. The proceeds will be used to refund \$1,771,000 of debt and to provide additional working capital.

Equipment Trust Plan Approved.—Authority has been granted the New York, New Haven & Hartford Railroad by the Interstate Commerce Commission to assume liability for \$3,645,999 of equipment trust certificates to be issued by the First National Bank, Boston, covering the advance rental necessary to procure equipment, which will include: Thirteen electric motor cars, five alternating-current electric locomotives, two alternating-current electric switching locomotives, two direct-current electric switching locomotives and one gasoline-electric plough.

Stock Sale Sanctioned.—Approval of the sale of 250,000 shares of no par value capital stock, at \$10 per share, by the Public Service Transportation Company, the bus service affiliated with the Public Service Railway, has been granted by the New Jersey Board of Public Utility Commissioners. The company will use the proceeds for the purchase of new buses and repay advances made to the corporation for purchases of buses.

May Make Offer for Company in Receivers' Hands.—Samuel H. Barker, representing interests which have not been named, may make an offer of \$250,000 for the Frankford, Tacony & Holmesburg Street Railway, Philadelphia, Pa. The company was placed in the hands of receivers following such request in Common Pleas Court on Jan. 20 this year. At that time it was pointed out by petitioners for the receiver that unless prompt action were taken operation would cease. The company operates 17.29 miles of track, 1.11 miles of which are leased from the Philadelphia Rapid Transit Company. It owns 42 passenger cars.

Receiver Named.—Judge Sanderson of the Massachusetts Supreme Court recently appointed Franklin T. Miller, president of the Boston & Worcester Street Railway, Framingham, Mass., as receiver for the company. Plans for the reorganization of the company are under way, as noted in recent issues of the ELECTRIC RAILWAY JOURNAL.

One Mile Abandonment Allowed.—Approval of the Public Service Commission to the abandonment by the Westchester Electric Railroad of about 1 mile of its route in the villages of Bronxville and Tuckahoe, N. Y., was granted on Feb. 13. The order requires the company to remove at its own expense its track and overhead structure and restore the streets to good condition.

Interurban Operation Successful.—Profit from interurban operations offset a \$24,500 loss for the Stark Electric Railroad, Alliance, Ohio, during 1924. During the year the city service showed a loss of \$20,053 while the freight service showed a loss of \$3,494. Receipts from interurban fares more than offset these deficits and placed a small fund in the treasury at the close of the year. During the 12 months 976,329 city passengers were carried and 2,076,812 interurban. Passenger cars covered 933,616 miles and freight cars 39,038. The Stark Electric Railroad operates from Salem to Canton, Ohio, a distance of 32 miles with city car service in Alliance only.

Personal Items

Messrs. Thornton, Blair and Lindsay Advanced at Montreal

Kenneth B. Thornton has been appointed assistant general manager of the Montreal Tramways, Montreal, Que. This is a new office in the company, rendered necessary by increased pressure of work. Mr. Thornton will act as assistant to Lieut.-Col. J. E. Hutcheson, vice-president and general manager of the company. Mr. Thornton was formerly general manager of the Canadian Light & Power Company and the Quebec & New England Hydro-Electric Corporation and consulting engineer for the Montreal Tramways.

D. E. Blair, formerly superintendent of rolling stock, has been appointed general superintendent of the tramway.

A. M. Lindsay, formerly connected with the rolling stock department of the tramway, will replace Mr. Blair as superintendent of rolling stock.

Mr. Blair has been with the tramways for the past 21 years. He is now president of the Canadian Electric Railway Association. He has worked his way up with the company from a comparatively minor position. He started his career with the Quebec Street Railway. A portrait and a biography of Mr. Blair were published in the *ELECTRIC RAILWAY JOURNAL* for June 21, 1924.

No Successor Selected to Mr. Kurtz

No successor has been chosen to Charles L. Kurtz, who refused to let his name go on the nomination list for president of the Columbus Railway, Power & Light Company, Columbus, Ohio, at the directors' meeting on Jan. 27. Clarence C. Slater was named vice-president and general manager and has been acting in official capacity since the meeting.

Frank T. Hulswit, president of the United Light & Railways Company, which through the United Light & Power Company secured control last August of the Continental Gas & Electric Corporation, which in turn has come into control of the Columbus Railway, Power & Light Company, declared on Feb. 10 that no one was being considered at the present for the presidency, although he said some one would be considered in the near future for this office.

Norman McD. Crawford, who resigned as vice-president of the company before the directors' meeting, effective on March 1, will stay until March 15.

A. L. C. Fell, until recently general manager of the London County Council Tramways, London, England, has accepted an invitation from the council of the Tramways and Light Railways Association to become a vice-president of that body. The invitation was extended to Mr. Fell as "a mark of sincere appreciation of his valuable services so long and so wholeheartedly placed at the disposal of the associa-

tion." It will be recalled that Mr. Fell a few months ago retired from the managership of the London tramways on account of ill health. No permanent successor to him has yet been appointed, but the County Council recently constituted a sub-committee to consider the subject. Meantime J. K. Bruce continues as acting manager.

George William Allan New President at Winnipeg

George William Allan was recently elected president of the Winnipeg Electric Company, Winnipeg, Man. He is the senior partner in the law firm of Munson, Allan, Laird, Davis, Haffner & Hobkirk, Winnipeg. The firm of Munson & Allan was formed



G. W. Allan

in 1882, and Mr. Allan has been an active member since that time. His firm was formerly general solicitor for the Winnipeg Electric Company.

Mr. Allan, who succeeds as president Sir Augustus Nanton, was educated at Upper Canada College, Galt Collegiate Institute, Trinity College School, and Trinity College University, and is a graduate of the latter. He was a member of the House of Commons for South Winnipeg from 1917 to 1921. For some years he has been actively associated with a number of companies doing business in western Canada, and he occupies the following among other positions: Director Canadian Bank of Commerce; member Canadian Committee of the Hudson's Bay Company; director Canada Permanent Mortgage Corporation; National Trust Company, Ltd.; Great West Life Assurance Company; the Northern Trust Company; the Northern Mortgage Company of Canada; the Canada Cement Company, Ltd.; Manitoba Bridge & Iron Works, Ltd.; Beaver Lumber Company; Home Investment & Savings Association; Guarantee Company of North America, and Beaver Fire Insurance Company. Mr. Allan was born at Moss Park, Toronto. He is a son of the late Senator G. W. Allan, P. C.

George W. Wells has been appointed vice-president and general manager of the Interstate Consolidated Street Railway and the Attleboro Branch Railroad, Attleboro, Mass., which have been taken over by Hemphill & Wells, New York City. Mr. Wells has long been connected with the street railway industry. For a number of years he was manager for one of the properties of Stone & Webster and before that was connected with the General Electric Company. He is a brother of Gardner F. Wells, one of the members of the firm that has taken over the roads.

P. C. Rideout has succeeded George M. Todd as superintendent of transportation of the Cumberland County Power & Light Company, Portland, Me.

H. B. McCune of Cleveland has succeeded Winchell G. Yates as superintendent of track and railway of the Wheeling Traction Company, Wheeling, W. Va. He was connected with Charles Clark, railway superintendent, previous to going to Wheeling.

F. H. Patterson has succeeded C. C. Bullock as superintendent of transportation of the Shreveport Railways, Shreveport, La.

F. S. Hunnewell, who has been superintendent of both the Interstate Consolidated Street Railway and the Attleboro Branch Railroad, Attleboro, Mass., has returned to the employ of the New England Investment & Security Company, Springfield, Mass., officers of which were also officers of the Attleboro properties. The two roads first mentioned were recently taken over by Hemphill & Wells, New York City.

C. F. Crockett has replaced V. M. Ake as secretary-treasurer of the Municipal Street Railway, Alexandria, La.

R. L. Clifford, formerly with the Toronto & York District, Ontario Hydro-Electric Railways, engineering department, has been appointed superintendent of the Peterborough Radial Railway, at Peterborough, Ont., which is operated as the Peterborough District, Ontario Hydro-Electric Railways, at Peterborough. He reports to W. R. Robertson, general superintendent of the Hydro-Electric Power Commission of Ontario's railways department, Toronto.

W. E. Bainhart has been appointed secretary of the Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan. O. S. Lamb is superintendent in charge of operation.

J. L. Puckett has replaced R. O. Bethea as electrical engineer and engineer of overhead construction of the Hattiesburg Traction Company, Hattiesburg, Miss.

J. W. Corbett has succeeded L. Va Voie as purchasing agent of the Canadian National Railways with offices at Toronto, Canada.

George R. Lunn, Schenectady, N. Y., former Lieutenant-Governor, has been nominated a member of the New York State Public Service Commission to succeed Oliver C. Semple, New York, whose term of office expired Feb. 1. The appointment is for a term of 10 years at a salary of \$15,000 a year. Governor Smith has transmitted the nomination to the Senate for approval.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

\$700,000 for Interurban Extension

The New York, Westchester & Boston Railway, New York City, plans immediate construction of a line to Larchmont Gardens and Mamaroneck at a cost of \$700,000.

Contracts have been awarded to Dwight P. Robinson & Company for the construction and the two municipalities probably will be linked with the metro-urban early next fall. The New York, Westchester & Boston will finance the project without any assistance from the New York, New Haven & Hartford Railroad.

Upon completion of the enterprise the company will have upward of 80 miles of track in operation between its metropolitan terminals and 25 suburban communities. The next step in the New York, Westchester & Boston expansion program will be an extension to Harrison, Rye and Portchester.

The new construction will be double track, with freight and terminal sidings, steel and concrete construction and overhead grade crossings.

When the road ran its first trains the aggregate population of the seven largest municipalities it tapped was 137,000. Today the population approaches 230,000. The combined assessed valuations were \$16,000,000. Today they are approximately \$429,030,000. In a statement which he made L. S. Miller, president of the railway, said:

The purposes of the builders of this road are looming toward fulfillment. Month by month the territory we serve is becoming more prosperous and more productive of traffic revenue.

In our first full year of operation we carried 2,874,000 passengers. Last year we carried 10,000,000. In our first year we

operated under a deficit, before taxes, of \$1,000,000. Our 1924 report will show that we operated upon a credit, before taxes, of more than \$530,000.

Our facilities for increased service with the addition of more rolling stock to the present equipment are immeasurable. We could transport 100,000,000 persons this year without difficulty.

The metro-urban is fast reaching the point where it will cease to be a liability to the New Haven and will become an important asset.

Brill Profits Smaller

For the year 1924 the combined output of the four plants of the J. G. Brill Company, Philadelphia, Pa., amounted in sales value to \$8,721,726. The combined output for each of the past 7 years was as follows:

1918	.....	\$16,761,154
1919	.....	14,210,622
1920	.....	17,537,293
1921	.....	7,647,898
1922	.....	10,177,582
1923	.....	18,167,486
1924	.....	8,721,726

After deducting from earnings all cost of operations, including maintenance and repairs for the year amounting to \$410,658, and after setting aside out of earnings reserves for depreciation of plant and equipment of \$252,795 and for Federal and State income taxes, not yet due, of \$92,310, the result of the operation of all the plants shows a net profit for the year of \$577,761.

It is explained that development work undertaken in connection with gasoline-propelled cars for use on steam railroads progressed satisfactorily during the past year and that the management believes, from present indications, that this branch will show very satisfactory growth the present year.

The amount of work on hand on Dec. 31, 1924, was approximately \$4,250,000, compared with \$3,500,000 on Dec. 31, 1923.

\$10,000,000 Shop Development for Brooklyn

Plans for the construction of one of the most complete repair shops and yards ever devised for passenger train service have been completed by the Board of Transportation of New York City for the Brooklyn-Manhattan System. In connection with this development bids have been invited and received for the construction of the foundation for the main repair shop and the inclosure of the electrical repair shop at Shell Road and Avenue X, Coney Island. The several buildings when completed will embrace an area of 65 acres with floor space of 475,000 sq.ft., affording storage capacity for 1,000 cars and inspection pits for 64 cars, as well as wharfage facilities on Coney Island Creek. The plant when finished will cost approximately \$10,000,000.

Seventeen contractors bid on the foundation work for the main repair shop and twelve contractors bid on the electrical repair shop inclosure. The total number of items in both jobs is 136.

The main repair shop building will be sufficient in its capacity and equipment to maintain in service and in a state of repair 3,000 steel cars of the type now in use on the Brooklyn-Manhattan Transit Corporation system. The main building of the proposed new group will contain machine shops, service shops, track assembly, motor and track shops, foundry and blacksmith shops, wheel and axle shops, carpenter shops, lumber storage, paint shops, cotton waste and oil storage and car washing stands.

The electrical repair shop soon to be inclosed will be for all motors and motor parts and for every electrical phase of motor and trail car used in rapid transit service.

The proposed improvement of the bulkhead and wharfage facilities on the shore of Coney Island Creek will provide for docking of scows, floats and barges from which to unload coal, rails, ties, timber and general freight for the maintenance and supply of the entire plant.

Mack's Bus Business Expanding

The Mack management is said to be devoting its entire energies and financial resources to the further expansion and development of its business, particularly in the bus division. Whereas in 1923 Mack was almost entirely a manufacturer of commercial trucks, its volume of bus business last year approached 20 per cent of the total, and at the rate of current expansion it is not unlikely that by the end of this year Mack's bus production will be close to the level of its truck operations.

Shipments of all classes of products for 1924 exceeded any previous years, and orders for December and January were in excess of any previous December and January in the company's history.

CONSOLIDATED PROFIT AND LOSS ACCOUNT OF THE J. G. BRILL COMPANY AND SUBSIDIARIES FOR THE YEAR 1923 AND 1924

	1923	1924
Total net sales billed.....	\$18,167,486	\$8,721,726
Cost of sales, including operating, selling, administration and general expenses and depreciation for the year.....	15,525,021	6,212,337
Miscellaneous income.....	\$2,642,465	\$509,389
	101,937	160,681
Operating profit.....	\$2,744,402	\$670,071
Less reserves:		
For federal and state income taxes.....	\$347,896	\$92,310
For special depreciation.....	150,000	
For development of gasoline-propelled vehicles.....	100,000	
	597,896	92,310
Net profit to surplus.....	\$2,146,506	\$577,761
Earned surplus at Dec. 31.....	\$3,582,971	\$4,985,196
Less:		
Adjustments of patents and good will.....	\$199,670	
Miscellaneous adjustments—credit.....	16,499	
	183,171	\$96,538
	\$3,399,800	\$4,888,657
Add profit as above.....	2,146,506	577,761
	\$5,546,306	\$5,466,418
Less dividends paid:		
Preferred.....	\$320,600	320,600
Common.....	240,510	240,510
	\$561,110	561,110
Earned surplus at Dec. 31.....	\$4,985,196	\$4,905,308

*Debit.

Metal, Coal and Material Prices

Metals—New York		Feb. 17, 1925
Copper, electrolytic, cents per lb.	14.50	
Copper wire base, cents per lb.	17.00	
Lead, cents per lb.	9.25	
Zinc, cents per lb.	7.77	
Tin, Straits, cents per lb.	57.00	
Bituminous Coal f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	\$4.45	
Somerset mine run, Boston, net tons	2.125	
Pittsburgh mine run, Pittsburgh, net tons	1.95	
Franklin, Ill., screenings, Chicago, net tons	1.875	
Central, Ill., screenings, Chicago, net tons	1.75	
Kansas screenings, Kansas City, net tons	2.50	
Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	\$7.25	
Weatherproof wire base, N. Y., cents per lb.	20.00	
Cement, Chicago net prices, without bags	2.20	
Lined oil (5-lb. lots), N. Y., per gal.	\$1.15	
White lead in oil (100-lb. keg), N. Y., cents per lb., carload lots	0.1297	
Turpentine (bbt. lots), N. Y., per gal.	0.935	

Rolling Stock

Coral Gables Utilities Company, Miami, Fla., has received three of the new cars to be operated between Miami and Coral Gables. The cars were built by the J. G. Brill Company and are of the same type as those used on the Miami municipal lines, but of slightly larger model.

Wisconsin Power & Light Company, Fond du Lac, Wis., has purchased four new buses of the parlor car type for use in Fond du Lac, Oshkosh, Waupun, Beaver Dam, Columbus and Madison.

Cleveland Railway, Cleveland, Ohio, has announced specifications of the 100 cars ordered last October. The plans for these cars were only recently approved by the City Council. The details of the cars follow:

Builder of car body	Cleveland Railway
Type of car	Front entrance, center exit, motor
Seating capacity	56
Total weight	41,140 lb.
Bolster centers, length	25 ft. 1 in.
Length over all	51 ft. 2 in.
Truck wheelbase	6 ft. 0 in.
Width over all	8 ft. 4 1/2 in.
Height, rail to trolley base	11 ft. 0 1/2 in.
Body	Semi-steel
Interior trim	Cherry
Headlining	4-in. Agasote
Roof	Plain arch
Air brakes	Westinghouse DH-20
Armature bearings	Babbitt
Axles	4 1/2-in. carbon steel
Bumpers	10-in. formed channel front, 6-in. rear
Car signal system	N-L indicating
Car trimmings	Brass
Center and side bearings	Cleveland
Conduits and junction boxes	Cleveland
Railway asbestos-lined sheet steel	
Control	Westinghouse K35-G
Couplers	Tomlinson Form 8, Type A
Destination signs	Hunter front and side
Door operating mechanism	Cleveland
Railway manual control	
Fare boxes	Cleveland
Fenders	Eclipse Type C
Gears and pinions	Tool Steel, spur
Hand brakes	Independent equalizing
Heater equipment	Peter Smith
Headlights	Dayton pressed steel
Journal bearings	Babbitt
Journal boxes	Symington, 1-F-9
Lightning arresters	Westinghouse MP
Motors	Four Westinghouse 340, inside and outside hung
Paint	Cleveland Railway standard
Sanders	N-L No. 4 vacuum trap
Sash fixtures	Cleveland Railway new type
Seats	Longitudinal front, Brill & H-K rear
Seating material	Rattan
Slack adjuster	Anderson
Step treads	Kass
Trolley catchers	Eclipse Railway Supply
Trolley base	Nuttall No. 15
Trolley wheels	Cleveland Railway standard
Trucks	Brill 51-E-1 and 63-E-1
Ventilators	N-L type
Wheels	26-in. steel

Springfield Street Railway, Springfield, Mass., has ordered three Garford buses, each seating 21 passengers, for use on Union Street.

Georgia Railway & Power Company, Atlanta, Ga., has placed orders for the immediate delivery of 20 new, large and modern cars. These will be put into operation as the jitneys cease to run. It is also reported that the company will order 15 20-passenger buses.

Missouri & Kansas Railway, Kansas City, Mo., suffered the loss by fire recently of four motor cars and three trailers at the Strang line carhouse in Overland Park. The damage was estimated at \$100,000. It is said that arrangements are being made to rent additional cars.

Citizens' Traction Company, Oil City, Pa., ordered during January from the Fageol Motors Company, Oakland, Cal., two six-cylinder buses of street-car type.

Track and Line

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., plans to double-track its 35th Street line from Clybourn Street to Wells Street, now a single-track line. As soon as this work is completed the 35th street line will be double-tracked along its entire length.

Worcester Consolidated Street Railway, Worcester, Mass., is considering the feasibility of including in its 1925 budget of expenses an appropriation for re-laying the car tracks on Park Avenue, Worcester. The cost will be about \$100,000.

Lehigh Valley Transit Company, Allentown, Pa., plans to relocate its roadbed through Center Valley and Coopersburg, Lehigh County, and to Zion Hill in Springfield Township. The idea of the relocation was broached by the State Highway Department last summer when the latter made announcement of the building this year of a concrete highway from Allentown by way of Quakertown to Spring House. If the company had remained on the highway it would have been compelled to rebuild its lines and place them in the center of the road. By the time the new private right-of-way is built it will mean an outlay of nearly \$500,000. The line will be a little more than 5 miles long, running from 300 to 1,500 ft. west of the present line. There will be ten crossings, eight at grade over lanes and two will be over-head.

Shops and Buildings

Puget Sound Power & Light Company, Seattle, Wash., has announced plans for a modern interurban train and bus station, to be located on Seventh Avenue and Olive Street to cost several hundred thousand dollars. The new terminal will be constructed around the west and south sides of the company's electric building. It will take the place of the present Everett interurban terminal on Sixth Avenue and Olive Street. The garage, storage yards and shops now occupying that

portion of the Olive Street property between the electric building and the Everett station will be moved to a modern building to be erected on a site owned by the company on Lake Union.

Trade Notes

Pure Carbon Company, Wellsville, N. Y., has appointed the Simpson Power Equipment Company as its Cleveland representative with offices at 7016 Euclid Avenue. The Pure Carbon Company has also announced the opening of a Detroit office in the General Motors Building.

Key System Transit Company has ordered full automatic Tomlinson couplers for 130 cars. These will be used to equip 12 new cars and to replace the present couplers on 118 old cars.

Hale-Kilburn Company, Philadelphia, Pa., has recently appointed H. Barney Gengenbach, with the title of Western sales manager, to its office in Chicago. Mr. Gengenbach has been acting Western sales manager for a year or more, since the death of Harry R. Rochester.

Hyatt Roller Bearing Company, Harrison, N. J., announces that H. A. Brown, Jr., general manager of sales, has appointed P. C. Gunion, for 6 years advertising manager of the Hyatt company, to a place on the sales board. Mr. Gunion will also head up the market research activities in addition to his advertising work. The Hyatt sales board is composed of the general manager of sales and his assistant, the advertising and research manager and the three sales managers in charge of the automotive, farm machinery and industrial divisions.

New Advertising Literature

Ditzler Color Company, Detroit, Mich., has issued an attractively arranged and cleverly prepared booklet entitled "Motor Bus and Taxi-Cab Colors." The folder in its illustrations offers some new and distinctive color combinations particularly adapted to the bus field. In its reading matter it proves that color is a sales argument recognized in many lines of business.

Uehling Instrument Company, Paterson, N. J., has issued bulletin 118-A, describing the principle of operation of the Apex pneumatic CO₂. The indicator of this meter is actuated by changes in pneumatic pressure developed by dry absorption of the CO₂.

Sawbrook Steel Castings Company, Lockland, Ohio, in an illustrated pamphlet, has announced the full operation of its foundry in the production of "high grade electric steel castings."

General Electric Company, Schenectady, N. Y., has issued bulletin 44103.1, describing the 60-ton oil-electric locomotive which it developed along with the American Locomotive and Ingersoll-Rand Companies. Illustrations showing the locomotive in service, views of the interior and tables of operating data and specifications, as well as a general description, are included in the booklet.



Peacock Staffless Brakes

Let a Real Railroad Man Tell You This!

Ask any experienced motorman what kind of hand brake he'd rather have you put on your cars.

He'll tell you to choose a brake that does not require a strong man to operate it—one that is powerful and quick acting—one that occupies small space—one that requires little attention—and one that will stop the car smoothly and swiftly no matter what the load or grade.

Peacock Staffless Brakes meet all these requirements most completely. They have the greatest chain winding capacity and the greatest leverage, yet they are simple in construction, low in first cost and economical in maintenance.

*Let us submit further details
and figures.*



National Brake Company**890 Ellicott Square****Buffalo, N. Y.***Canadian Representative***Lyman Tube & Supply Co., Ltd., Montreal, Can.**

Bankers and Engineers

Ford, Bacon & Davis Incorporated Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation

Engineers—Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES

New York

Boston

Chicago

THE BEELER ORGANIZATION

ENGINEERS AND CONSULTANTS

Traction-Traffic-Equipment-Power

COORDINATION OF SERVICE—IMPROVED OPERATIONS

INCREASED TRAFFIC—FINANCIAL REPORTS

APPRAISALS—MANAGEMENT

52 Vanderbilt Ave.

New York City

SANDERSON & PORTER ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT and POWER PROPERTIES

CHICAGO

NEW YORK

SAN FRANCISCO

ENGELHARDT W. HOLST

Consulting Engineer

Appraisals, Reports, Rates, Service Investigation,
Studies on Financial and Physical Rehabilitation
Reorganization, Operation, Management

683 Atlantic Ave., Boston, Mass.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly Pass—Differential Fares
Ride Selling

143 Crary Ave., Mt. Vernon, N. Y.

Byllesby Engineering & Management Corporation

208 S. La Salle Street, Chicago

New York

Tacoma

DAY & ZIMMERMANN, INC. ENGINEERS

DESIGN - CONSTRUCTION - REPORTS
VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

STEVENS & WOOD, INC.

Design and Construction of Power Stations
Railroad Electrification, Industrial Plants

REPORTS AND APPRAISALS

Management and Financing of Utilities and Industrials

Mahoning Bank Bldg.
Youngstown, O.

120 Broadway
New York

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells

Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management Operation Construction

43 Cedar Street, New York City

JAMES E. ALLISON & CO.

Consulting Engineers

Specializing in Utility Rate Cases and
Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.

HUMAN ENGINEERING

Railway Audit and Inspection Company, Inc.

Franklin Trust Building, Philadelphia

Boston New Orleans } BRANCHES { Baltimore Atlanta
New Orleans Pittsburgh } Chicago St. Louis

Dwight P. Robinson & Company

Incorporated

Design and Construction of

Electric Railways, Shops, Power Stations

125 East 46th Street, New York

Chicago Youngstown Atlanta Philadelphia
Los Angeles Montreal Rio de Janeiro

The Most Successful Men in the Electric Railway

Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

TRADE

ANDERSON

Overhead Line Material

MARK



Make your renewals and repairs on the overhead line with material that has stood the test, under the most exacting conditions, for over thirty years.

Anderson knows how to make good, dependable Line Material—always keeping abreast of the times, as the industry progresses, in the design and manufacture of improved material.

There's a big sense of satisfaction in installing Anderson's because you know you can *depend* upon any Line Material bearing that name.

We will be glad to forward you quotations on any Line Material we make.

Albert & J. M. Anderson Mfg. Co.

289-305 A St., Boston, Mass.

New York—135 Broadway

Chicago—105 South Dearborn St.

Philadelphia—429 Real Estate Trust Bldg.

London, E. C. 2, England

JOE R. ONG

Consulting Transportation Engineer

Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation

PIQUA, OHIO

C. B. BUCHANAN
President

W. H. PRICE, JR.
Sec'y-Treas.

JOHN F. LAYNG
Vice-President

BUCHANAN & LAYNG CORPORATION

*Engineering and Management, Construction,
Financial Reports, Traffic Surveys
and Equipment Maintenance*

BALTIMORE
825 Equitable Bldg.

Phone:
Hanover 2142

NEW YORK
49 Wall Street

THE P. EDWARD WISH SERVICE

50 Church St.
NEW YORK

Street Railway Inspection
DETECTIVES

131 State St.
BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

**Transmission Line and Special Crossing
Structures, Catenary Bridges**

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.

Engineers and Contractors

SYRACUSE, N. Y.

A. L. DRUM & COMPANY

Consulting and Constructing Engineers
VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE
COMMISSIONS
CONSTRUCTION AND MANAGEMENT OF
ELECTRIC RAILWAYS

230 South Clark Street
Chicago, Ill.

215 South Broad Street
Philadelphia, Pa.

The Most Successful Men in the Electric Railway
Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

Bureau of Commercial Economics, Inc.
Industrial Engineers

Organization • Methods • Layout and Facilities
Public and Industrial Relations

72 West Adams Street • CHICAGO



Collier Service

A nation-wide
organization
building and
sustaining car
card advertising
space values



Barron G. Collier, Inc.

Candler Bldg.

New York

It's no fun to be a pavement in electric railway service—

Clank—clank!—a car goes over a rail joint and something has to absorb the impact.

Crunch—crunch!—a ten-ton truck lumbers across the tracks and the pavement catches the jolt.

Those things happen all the year around—and in addition—

—in winter, moisture freezing below presses upward with terrific force—

—in summer, the broiling sun expands the pavement until it is tempted to buckle and throw up the job—

—in wet and snowy weather, tire chains gnaw and chew at its surface.

Six-point-service—

I
absorbs impacts at rail joints

II
water-seals road-bed and ties

III
allows for contraction and expansion

IV
resists heaviest traffic

V
is easily removable for track repairs

VI
practically 100% salvage value

VITRIFIED
Brick
PAVEMENTS

It's all hard work being a pavement—that's why it's good business to put the job up to vitrified brick, asphalt-filled. It has the grit to stand the gaff.

OUTLAST THE BONDS

NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION, ENGINEERS BLDG., CLEVELAND, OHIO

Alton Brick Company
Alton, Ill.
Binghamton Brick Company
Binghamton, N. Y.
Central Clay Products Co.
(Distributors MACK Paving Brick)
Wilkes-Barre, Pa.
Cleveland Brick & Clay Company
Cleveland, Ohio
Clydesdale Brick & Stone Co.
Pittsburgh, Pa.
Coffeyville Vitrified Brick & Tile Co.
Coffeyville, Kans.
Collinswood Shale Brick Company
Cleveland, Ohio
Francis Vitrified Brick Company
Boynton, Okla.
Georgia Vitrified Brick & Clay Co.
Augusta, Ga.
Globe Brick Company
East Liverpool, Ohio
Hillsylvania Coal Co.
Columbus, Ohio
Hocking Valley Brick Company
Columbus, Ohio
Independence Paving Brick Co.
Independence, Kans.
Metropolis Paving Brick Co.
Pittsburg, Kansas
Metropolitan Paving Brick Co.
Canton, Ohio
Mineral Wells Brick Co.
Mineral Wells, Texas

Moberly Paving Brick Company
Moberly, Mo.
Murphysboro Paving Brick Co.
Murphysboro, Ill.
Nelsonville Brick Co.
Nelsonville, Ohio
Peebles Paving Brick Company
Portsmouth, Ohio
Purinton Paving Brick Company
Galesburg, Ill.
Southern Clay Mfg. Company
Chattanooga, Tenn.
Springfield Paving Brick Company
Springfield, Ill.
Sterling Brick Company
Olean, N. Y.
Streator Clay Mfg. Company
Streator, Ill.
Thornton Fire Brick Co.
Clarksburg, W. Va.
Thurber Brick Company
Ft. Worth, Texas
Toronto Fire Clay Company
Toronto, Ohio
Trinidad Brick & Tile Company
Trinidad, Colo.
Veederburg Paver Company
Veederburg, Ind.
Western Shale Products Company
Fort Scott, Kans.
Westport Paving Brick Company
Baltimore, Md.

All Railroads Realize the Importance

of a well built life guard—one that will prevent fatal accidents and may be depended upon in an emergency—also keep down maintenance costs.

THE H-B LIFE GUARD

Manufactured by the Consolidated Car Fender Co.

will do this for the reason that their high standard of quality and workmanship has never been lowered nor sacrificed to price and every guard they make is *built up to a standard—not down to a price*. Notwithstanding this our prices for H-B Life Guards and parts are most reasonable due to quantity production and standardized manufacture.

Our *Improved Providence Type H-B Life Guard* with all metal basket reduces maintenance to a minimum. It is interchangeable with our standard wood slat basket.

*When making up your new car specifications
be sure to specify*

“HB Life Guards Manufactured by the Consolidated Car Fender Co.”

Providence, R. I.

WENDELL & MacDUFFIE CO., Gen. Sales Agents
110 East 42nd St., New York, N. Y.



1. Passengers are protected from injury when entering and leaving a car by Pneumatic.....

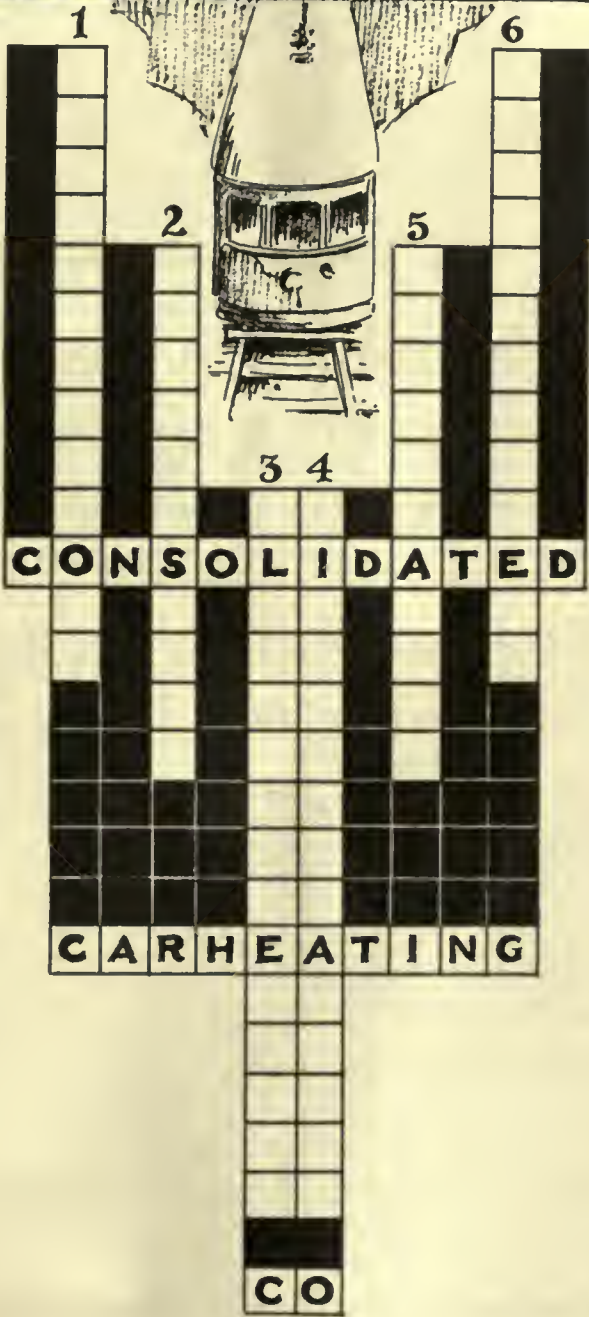
2. A practically constant temperature is maintained by the automatic control by visible..

3. And this heat which is supplied by the many suitable types and sizes of..

4. The motorman is informed when to start and stop his car by a complete and efficient.....

5. In closely crowded cars, well planned..... keep the air healthful for passengers.

6. In fact every thing for the..... and..... of operator and patron is made by this Company.



The solution appears in next week's advertisement!

CONSOLIDATED CAR HEATING COMPANY
NEW YORK ALBANY, N. Y. CHICAGO



TISCO



3-WAY SWITCH LAYOUT DESIGNED FOR AN EASTERN RAILWAY

Special Trackwork

Our facilities for the production of this work are of the highest order. Whatever traffic conditions may be, we are prepared to design the proper trackwork. Our experience embraces all the stages of street railway development, and engineers are invited to avail themselves of it. The use of TISCO Manganese steel for trackwork originated in this company; we have developed its use to an unusually high degree of perfection.

Wm. Wharton, Jr., & Co., Inc., Easton, Pa.

Taylor-Wharton Iron & Steel Co.

Wm. Wharton, Jr., & Co., Inc. / Tioga Steel & Iron Co.
Philadelphia Roll & Mach. Co.

20,000 Tons

A record purchase of One Size

Relaying Rails

85 lb. A. S. C. E. Section with Angle Bars

MAIN LINE QUALITY

For immediate or deferred shipment

Quality Guaranteed

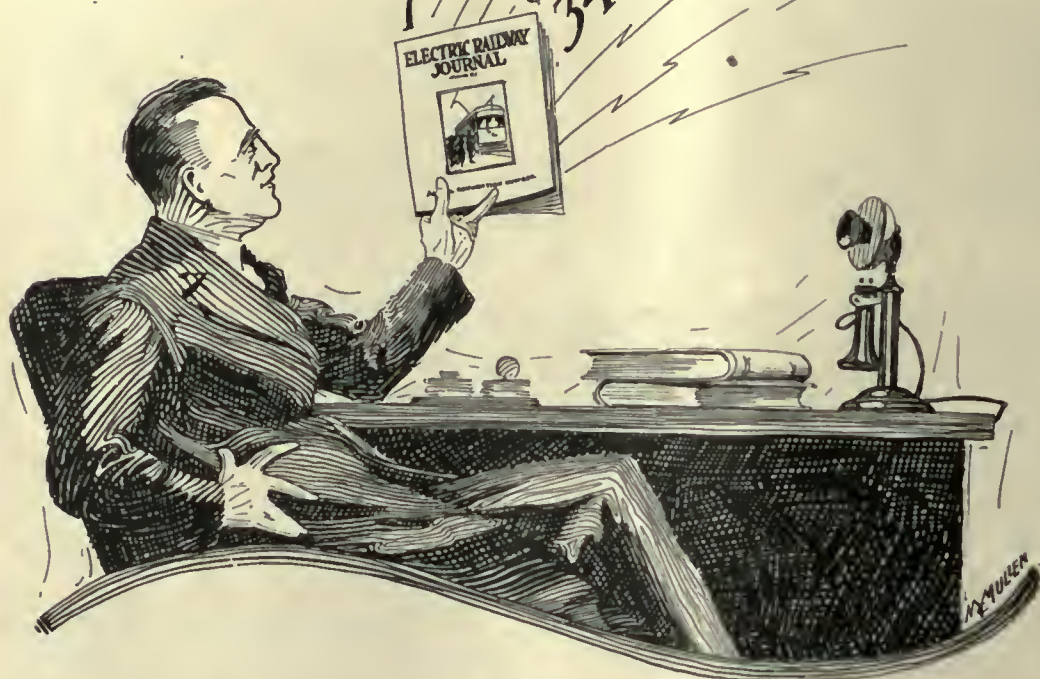
1 Ton or 1000

Price 30% to 50% below cost of New Rails

Phone, write or wire for quotation



*The Magnet
that pulls
your share of
this business*



\$342,000,000 will be spent by electric railway companies during 1925 for new equipment, materials and supplies.

The "modernization program" is behind this tremendous expenditure. To keep pace with progress they must cultivate better public relations and this necessitates up-to-date maintenance.

Modern maintenance practices, methods and equipment will be featured in the March 21st issue of **ELECTRIC RAILWAY JOURNAL**.

The Annual Maintenance Number

This issue will blanket 99% of the buying power of the field. So that your instructions may receive the most careful attention, make immediate reservation for space and copy service.

Electric Railway Journal

Tenth Avenue at 36th Street, New York, N. Y.

**ANNUAL
Maintenance
Number**

**MARCH
21st**



SILENT!

Silent, smooth meshing gears minimize wear, tear, rattle, vibration and the resultant maintenance expenses.

NUTTALL HELICAL GEARS

Almost unbelievably quiet and smooth, Nuttall Helical gears are peculiarly suited to electric railway service.

Being scientifically correct in design, forged and heat-treated, Nuttall Gears are exceptionally enduring. They are guaranteed to last at least four times as long as ordinary gears and remain quiet and smooth in operation.

Nuttall gears will lengthen the life of equipment and cut gear costs in the bargain. Our free gear book tells you why.

R.D. NUTTALL COMPANY
PITTSBURGH  PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

Not Merely the Tie that Lasts— But the Tie that ALSO MAKES the Track Foundation LAST!

A permanent tie is a great thing. But a permanent tie that helps make the track foundation permanent also is greater yet.

The Dayton Resilient Tie is such a tie. Embedded in concrete, it absorbs the shocks of traffic and prevents them from reaching and disintegrating the concrete foundation.

Its use in concrete really means then a permanent tie in a permanent foundation.

THE DAYTON MECHANICAL TIE CO.
707 Commercial Building, DAYTON, OHIO

DAYTON *Resilient* TIE



Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000 Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company
Muncie, Ind.

Est. 1848—Inc. 1870



Reg. U. S. Pat. Office

Incandescent Lamp Cord

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE
AND CABLE

PAPER INSULATED
UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 174 Federal; Chicago, 112 W. Adams;
Cincinnati, Tracton Bldg.; New York, 180 N. 42nd St.

Almco



A

521 Huntingdon St., Philadelphia, Pa.

SEND TODAY

for our new Publication

on
SAFETY

and

EFFICIENCY

in Electric Railway
Signals and
Crossing Bells

**American Insulating
Machy. Co., Inc.**

STANDARD

Wires, Cables, Cable Accessories
Superior quality, economical prices
Standard Underground Cable Co.
Boston Philadelphia Pittsburgh Detroit
New York Washington Chicago St. Louis
San Francisco

Hubbard Trolley Pole Bands



Split

Made of Open Hearth Steel.
Galvanized by the Double-
Dip process.
Your best insurance for long
service and durability.
Ask Your Jobber



Solid

HUBBARD & COMPANY

Pittsburgh

Chicago

ANACONDA TROLLEY WIRE

ANACONDA COPPER
MINING COMPANY
Conway Building, Chicago, Ill.



THE AMERICAN
BRASS COMPANY
General Office, Waterbury, Conn.



U. S. ELECTRIC AUTOMATIC SIGNAL

for single track block signal protection

United States Electric Signal Co.

West Newton, Mass.

Shaw Lightning Arresters

Standard in the Electric Industries
for 35 years

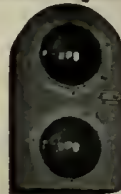
Henry M. Shaw

150 Coit St., Irvington, Newark, N. J.

ROEBLING

WELDING CABLE
ELECTRICAL WIRES and CABLES
John A. Roebling's Sons Company, Trenton, N. J.

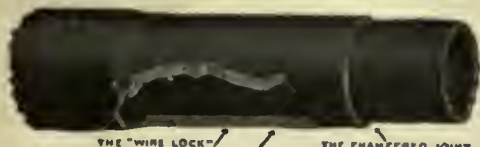
Chapman
Automatic Signals
Charles N. Wood Co., Boston



AUTOMATIC SIGNALS
Highway Crossing Bells
Headway Recorders
Flasher Relays

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.



ELRECO TUBULAR POLES**COMBINE**

Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
 CINCINNATI, OHIO
 New York City, 30 Church Street

BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.
 Established 1858

Manufacturers of

Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

Arc Weld Rail Bonds

AND ALL OTHER TYPES

Descriptive Catalogue Furnished

American Steel & Wire Company

Chicago
 New York
 Boston
 Cleveland
 Pittsburgh
 Denver

U. S. Steel Products Co.
 San Francisco

Los Angeles

Portland

Seattle

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of
 Water Tube Boilers
 of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
 PHILADELPHIA, Packard Building
 PITTSBURGH, Farmers Deposit Bank Building
 CLEVELAND, Guardian Building
 CHICAGO, Marquette Building
 CINCINNATI, Traction Building
 ATLANTA, Candler Building
 PHOENIX, ARIZ., Heard Building
 DALLAS, TEX., 2001 Magnolia Building
 HONOLULU, H. T., Castle & Cooke Building
 PORTLAND, ORE., 305 Gasco Building



WORKS

Bayonne, N. J.
 Barberton, Ohio

**Makers of Steam Superheaters
 since 1898 and of Chain Grate
 Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
 NEW ORLEANS, 521-5 Baronne Street
 HOUSTON, TEXAS, Southern Pacific Building
 DENVER, 435 Seventeenth Street
 SALT LAKE CITY, 405-6 Kearns Building
 SAN FRANCISCO, Sheldon Building
 LOS ANGELES, 404-6 Central Building
 SEATTLE, L. C. Smith Building
 HAVANA, CUBA, Calle de Aguilar 104
 SAN JUAN, PORTO RICO, Royal Bank Building

Cambria Forged Steel Electric Car Axles

To Meet Most Rigid Specifications



Other products for the electrical field includes wheels, armature shafts, rails, spikes, track work, splice bars, bolts, tie plates, tie rods, pole line material, sheets, magnet steel and gear blanks.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

BETHLEHEM

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa.

Sales Offices:

Atlanta	Chicago	Cleveland	New York
	Philadelphia	Pittsburgh	
	<i>Pacific Coast Representatives:</i>		
	United States Steel Products Company		
Los Angeles	Portland	San Francisco	Seattle

Export Representatives:

United States Steel Products Company, New York, N. Y.

'CARNEGIE'

for WHEELS AXLES RAILS CROSS TIES



Carnegie Steel Company
PITTSBURGH, PENNA.

THE WORLD'S STANDARD "IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.
Irvington, N. J.

Sales Representatives in the Principal Cities

DUNDEE "A" AND "B" FRICTION TAPES



are
Okonite
Products
'Nuff Said!



Write for Samples and Circulars

THE OKONITE Co., Passaic, N. J.

Incorporated 1884

SALES OFFICES: New York Chicago Pittsburgh St. Louis
Atlanta Birmingham San Francisco
F. D. Lawrence Electric Co., Cincinnati, O.; Novelty Electric Co., Philadelphia,
Pa.; Pettibone-Andrews Co., Boston, Mass.
Canadian Representatives: Engineering Materials Limited, Montreal



B. A. HEGEMAN, Jr., President
H. A. HEGEMAN, Vice-Pres. and Treas.
W. C. PETERS, Manager Sales and Engineering

C. C. CASTLE, First Vice-President
F. T. SARGENT, Secretary

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and
Change Maker
The Aluminum Field Cots
Walter Tractor Snow Flows
Cutler-Hammer Electric
Heaters
Pittsburgh Forge & Iron
Co.'s Products
Genesco Paint Oils
E. Z. Car Control Corpora-
tion's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s
Single and Double Deck
Busses

Economy Electric Devices
Co.'s Power Saving and
Inspection Meters
Anglo-American Varnish Co.
Varnishes, Enamels, etc.
Gilmer Multiple Safety Steo
Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co.
Springs
Turostile Car Corporation's
Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

"Longwear" Pins and Bushings Hard—Accurate—Uniform



Renewal Materials
for Peckham and
other Trucks
Castings—Forgings
Springs

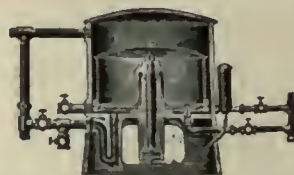
E.G. Long Company

50 Church Street, New York, N. Y.

Turbine driven Reclaiming Machine

saves

Oil and Wiping Waste



The Oil & Waste Saving Machine Co.

1509 Real Estate Trust Bldg., Philadelphia, Pa.
Dept. D.

SEVEN WORKS
RAMAPO-AJAX-ELLIOT

HILLBURN NEW YORK
NIAGARA FALLS N.Y.
CHICAGO, ILLINOIS
EAST ST. LOUIS, ILL.
PUERTO COLORADO
SUPERIOR WISCONSIN
NIAGARA FALLS ONT.
CANADA

Ramapo Ajax Corporation

**RAMAPO AUTOMATIC
RETURN SWITCH STANDS
FOR PASSING SIDINGS**

TEE RAIL SPECIAL WORK

MANGANESE CONSTRUCTION

SALES OFFICES AT ALL WORKS
Main Office, HILLBURN, N.Y.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

HORNE & EBLING CORPORATION

50 CHURCH ST.,

NEW YORK, N. Y.

Brass Hardware
For Cars and Buses

Motor and Controller
Parts



Sterling Trolley Bases
and Brakes

Mall. Iron and Brass
Castings



Car Heating and Ventilation

are two of the winter problems that you must
settle without delay. We can show you how
to take care of both, with one equipment.
Now is the time to get your cars ready for
next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.



TRUCK WITH TOWER IN RUNNING POSITION

TRENTON TOWER

This 3-Section

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

J. R. McCARDELL CO.

Trenton, New Jersey, U. S. A.

PERFECT
MICANITE
INSULATOR

Reg. U. S. Pat. Off.

ELECTRICAL INSULATION

Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

Catalogs will gladly be furnished

MICA INSULATOR COMPANY

Sole Manufacturers of Micanite

Established 1893.

68 Church St., New York

542 So. Dearborn St., Chicago

Works: Schenectady, N. Y.

8-F

N-L Ventilators are Absolutely WEATHER PROOF



Rain! Snow! Cold, searching winds! Don't make your cars stuffy and uncomfortable this winter in order to keep them warm. *Assure yourself* that your passengers will be comfortable. N-L Ventilators will furnish adequate ventilation and are absolutely weather proof under all conditions. Many different designs for street car and bus use.

*Write for our booklet,
"Superior Ventilation" for complete detail
and information*



The Nichols-Lintern Co.

7960 Lorain Ave., Cleveland, Ohio

Canadian Representative: Railway & Power Eng. Corp., Ltd., Toronto, Ontario

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

ALLIS-CHALMERS
MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines,
Condensers, Gas and Oil Engines, Air Compressors,
Air Brakes



ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed.
Up-to-date and economical.

Alumino-Thermic Corp., Roselle Park, N. J.

OXYGEN, ACETYLENE, HYDROGEN for cutting, welding, etc.

Quick shipment and low prices also on cylinders, valves,
torches, regulators and supplies.

INTERNATIONAL OXYGEN COMPANY

Main Offices: Newark, N. J.

Branch Offices: New York

Pittsburgh

Toledo



Type R-11
Double Register

International Registers

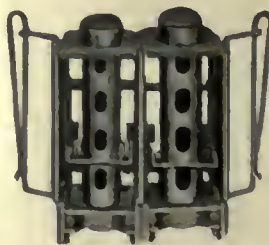
Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for
HEEREN ENAMEL BADGES.

The International Register Co.

15 South Throop Street, Chicago, Illinois

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY

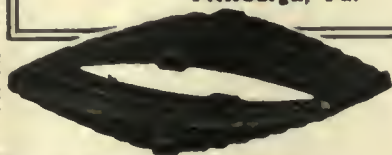
Ravenwood, Chicago, Ill.

Play for safety—
plus resiliency—
plus long life

By specifying

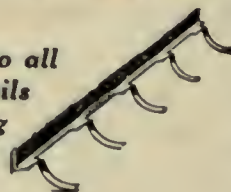
FORT PITT SPRINGS

FORT PITT SPRING &
MFG. CO.
Pittsburgh, Pa.



GODWIN Steel Paving Guards

Adapted to all
types of rails
and paving



Proven by service
to economically
prevent seepage
and disintegration
of street railway
paving.

Write for Illustrated Catalog No. 20.

W. S. GODWIN CO., Inc.
RACE & McCOMAS STS., BALTIMORE, MD.

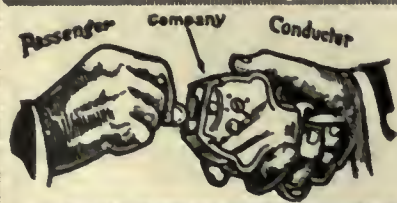
Let Us Tell You of Our Especially Designed Fare Box for the

ONE MAN CAR

THE CLEVELAND FARE BOX COMPANY

Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd., Preston, Ontario



Direct
Automatic
Registration
By the
Passengers

Rooke Automatic
Register Co.
Providence, R. I.



Gets Every Fare PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and
Street Cars

Perey Manufacturing Co., Inc.
101 Park Avenue, New York City

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No.
478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings
Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

HALE-KILBURN CAR SEATS

For Every Class of Service

General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

Exterior Side Panels, Letter Boards and
Vestibule Linings of

PLYMETL

Increase Strength, Save Weight and Operating Costs
HASKELITE MFG. CORP., 133 W. Washington St., Chicago, Ill.



THE ELECTRIC RAILWAY IMPROVEMENT CO.
CLEVELAND, OHIO

BRAKE SHOES

AERA Standards
Brake Heads



Diamond "S" Steel Back and Lug Shoes
best for all equipment.

Manufactured and sold under U. S.
Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York

332 So. Michigan Ave., Chicago

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

W. J. Jeandron

345 Madison Avenue, New York

Pittsburgh Office: 634 Wabash Bldg.

Chicago Office: 1657 Monadnock Block

San Francisco Office: 525 Market Street

Canadian Distributors: Lyman Tube & Supply Co., Ltd.
Montreal and Toronto

McGuire-Cummings Manufacturing Co.

General Offices:
111 W. Monroe St., Chicago, Ill.



Street Cars
Trucks
Snow Sweepers



The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.



We make a specialty of
**ELECTRIC RAILWAY
LUBRICATION**

We solicit a test of TULC
on your equipment

The Universal Lubricating Co.
Cleveland, Ohio

Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City



not just pinions, but
"Tool Steel" pinions.

Quality and Service.

Tool Steel Quality

The Tool Steel
 Gear and Pinion Co.
 CINCINNATI, O.



Complete satisfaction

Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

No-wear Check Pawl
 Free-Winding Tension Spring
 Ratchet Wind
 Emergency Release
 Perfect Automatic Lubrication

Earll Catchers and Retrievers

C. I. EARLL, York, Pa.



"Differential Two-Car Train. Trailer dumping load clear of trench."

DIFFERENTIAL CARS

Standard on Fifty Railways for

Track Maintenance	Track Construction
Ash Disposal	Hauling Cross-ties
Placing Ballast	Disposal of Waste
Coal Hauling	Snow Disposal
Concrete Materials to the Job	
Excavated Material to the Dump	

For Economy

THE CLARK CONCRETE BREAKER
 THE DIFFERENTIAL BOTTOM DUMP CAR
 THE DIFFERENTIAL COMBINATION
 CAR-WHEEL TRUCK and TRACTOR

THE DIFFERENTIAL STEEL CAR CO.

Findlay, Ohio, U. S. A.



M-J No. 10 Lubricated Type Trolley Wheel

Equipped in our No. 6 harp on the bottle-shape principle which prevents fouling or catching overhead lines.

Detailed information and prices on request.

Designed for high speed, simplicity and economy.

More-Jones
 Brass & Metal Co.
 St. Louis, Mo.



Electrical Insulation and Headlinings
 THE PANELYTE COMPANY, Trenton, N. J.

RAILWAY UTILITY COMPANY

CAR COMFORT WITH
UTILITY

HEATERS
 REGULATORS
 VENTILATORS

141-151 West 22d St.
 Chicago, Ill.

Write for
 Catalogue

1328 Broadway
 New York, N. Y.

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.
Positions Vacant and all other classifications, 5 cents a word, minimum charge \$2.00.
Proposals, 10 cents a line an insertion.

INFORMATION

Big Numbers in care of any of our offices count 10 words additional in undisplayed ads.
Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH

1 in 1 inch 14.00 a line
1 in 7 inches 1.00 a line
1 in 14 inches .40 a line
Rates for 14 per line, yearly rates, 10% discount in advertising (each is measured vertically in columns 3 in 1 in 6 a day).

R.F.J.

POSITIONS VACANT

EXPERIENCED man wanted to take charge of our car shops and equipment, which consists of 12 passenger motor cars, 2 motor express cars, one snow plow and 6 passenger trailers; will require a man capable and willing to do armature winding, field repairing, etc.; one who is thoroughly familiar with general repairs to interurban cars and general car shop work; give all reference, salary required and when services can be had in first letter; position located in Northwest. P-781, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SPECIAL track work draftsmen wanted, preference given men having had experience with special track work manufacturer, but will consider one or two junior draftsmen familiar with trigonometry. State age, experience and salary in first letter. P-774, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

ACCOUNTING executive, railway, electric and gas utilities, now employed, seeks change; can produce results. PW-780, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

ARE you thinking "buses"? Am seeking opportunity to take full charge of growing bus department or one now being organized. At present assistant to manager of large bus company which have helped to organize and operate. Thorough knowledge of city and intercity bus business. Ten years' transportation experience including operation and traffic promotion. Executive and business ability. Good education and appearance. PW-783, Electric Railway Journal, 10th Ave. at 36th St., New York.

LAW GRADUATE, 37 years old, five years' practice, 11 years public service, mayor city owning public utilities, desires employment with bus transportation company, or auxiliary, bus department electric railway; good, direct speaker. Salary to start \$3,000. Address PW-789, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

MASTER mechanic, 18 years' experience on city and interurban railways. Best of reference. PW-786, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

STREET railway engineer; 12 years' experience in way, structures, costs, familiar with street railway accounting. Also fair knowledge of electrical engineering. Best references. PW-787, Electric Railway Journal, 10th Ave. at 36th St., New York.

SALESMAN WANTED

Side Line
Salesman who is already calling on, or in touch with street railways in the eastern part of the United States to take on a new article for sale, paying a good commission for which there is a great demand, and very little competition. SW-784, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

FOR SALE

20—Birney Safety Cars. Brill built. Seating 32.

8—Steel Interurbans, 48 ft. long. Seating 52.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.



In Small Lots
As Well As Large

THERE is a class of rail buyers, occasionally in need of only small tonnages, who are paying a premium on their purchases elsewhere because they believe that we do not seek their patronage.

We maintain a large organization to give efficient service on small orders. Our tremendous volume gives us unequalled buying power and saves our clients money regardless of the tonnage required.

Immense stocks at strategic distributing points provide complete assortments near you. This adds a saving in freight to our already unbeatable prices.

Next time you need rails, let us know your requirements.

We guarantee the same prompt, efficient service to all.

HYMAN-MICHAELS COMPANY

"The House of Dependable Service"

122 South Michigan Avenue, Chicago

Dealers in New and Relaying Rails,
Locomotives and Railway Equipment

District Offices: New York, Woolworth Bldg.;
St. Louis, Railway Exchange Bldg.; Pittsburgh, First Nat'l Bank Bldg.;
San Francisco, 234 Steuart St.

Yards: St. Louis, East Chicago, Ind., McKee's Rocks, Pa., San Francisco.
Cable Address: "Hymanmike"

World's Largest Distributors of Rails

WANTED

32 G. E. 1000

MOTORS

TRANSIT EQUIPMENT COMPANY

Cars—Motors

501 Fifth Ave., New York

WANTED

Orders for Oak, Car Stock,
Cross Ties, Switch Ties, Timber

Have four mills in operation. A good stand of timber. Grades guaranteed. Prices right. Let's get acquainted.

ENARO LUMBER MFG. CO.

411 A. G. U. W. Bldg., Little Rock, Ark.

Relaying Rails

NEW RAILS—ACCESSORIES

See our full page
announcement on
page 27.

1 Ton or 1000

LB FOSTERCO

PITTSBURGH, PA. NEW YORK CITY,
JERSEY CITY - PHILADELPHIA - HAMILTON

"Opportunity" Advertising:
Think "SEARCHLIGHT" First!

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

- Advertising, Street Car**
Collier, Inc., Barron G.
- Air Receivers & Aftercoolers**
Ingersoll-Rand Co.
- Anchors, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Appraisals**
American Appraisal Co.
- Armature Shop Tools**
Elec. Service Supplies Co.
- Automatic Return Switch Stands**
Ramapo Ajax Corp.
- Automatic Safety Switch Stands**
Ramapo Ajax Corp.
- Axles**
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Johnson & Co., J. R.
- Axles, Steel**
Carnegie Steel Co.
Laclede Steel Co.
- Badges and Buttons**
Elec. Service Supplies Co.
Int. Register Co., The
- Batteries, Dry**
National Carbon Co.
- Bearings and Bearing Metals**
Bemis Car Truck Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
- Bearings, Center and Roller Side**
Stucki Co., A.
- Bells and Gongs**
Brill Co., The J. G.
Elec. Service Supplies Co.
St. Louis Car Co.
- Boilers**
Babcock & Wilcox Co.
- Bond Testers**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
- Bonding Apparatus**
Amer. Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
- Bonds, Rail**
Electric Railway Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.
- Brackets and Cross Arms**
(See also Poles, Ties, Posts, etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
- Electric Ry. Equipment Co.**
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
- Brake Adjusters**
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
- Brake Shoes**
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
- Brakes, Brake Systems and Brake Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
- Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
National Carbon Co.
Westinghouse E. & M. Co.
- Brushes, Graphite**
National Carbon Co.
- Brushes, Wire, Pneumatic**
Ingersoll-Rand Co.
- Bulkheads**
Haskelite Mfg. Co.
- Buses, Motor**
Brill Co., The J. G.
Fageol Motors Co.
International Motor Co.
- Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.
Long Co., E. G.
St. Louis Car Co.
- Cables (See Wires and Cables)**
- Cambrie Tapes, Yellow and Black Varnished**
Irvington Varnish & Ins. Co.
Mica Insulator Co.
- Carbon Brushes (See Brushes, Carbon)**
- Car Panel Safety Switches**
Westinghouse E. & M. Co.
- Cars, Dump**
Differential Steel Car Co.
St. Louis Car Co.
- Car Lighting Fixtures**
Elec. Service Supplies Co.
- Car Panel Safety Switches**
Consolidated Car Heat's Co.
Westinghouse E. & M. Co.
- Cars, Passenger, Freight, Express, etc.**
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
Wason Mfg. Co.
- Cars, Self-Propelled**
General Electric Co.
- Car Wheels, Rolled Steel**
Bethlehem Steel Co.
- Castings, Brass, Composition or Copper**
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.
- Castings, Gray Iron and Steel**
Bemis Car Truck Co.
- Castings, Malleable and Brass**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Horne & Ebling Corp.
St. Louis Car Co.
- Catchers and Retrievers, Trolley**
Earl, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
- Catenary Construction**
Archbold-Brady Co.
- Change Carriers**
Cleveland Fare Box Co.
- Circuit-Breakers**
Anderson, A. & J. M., Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Clamps and Connectors for Wires and Cables**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Cleaners and Scrapers, Track**
(See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
St. Louis Car Co.
- Clusters and Sockets**
General Electric Co.
- Coal and Ash Handling (See Conveying and Hoisting Machinery)**
- Coil Handling and Winding Machines**
Elec. Service Supplies Co.
- Coils, Armature and Field**
General Electric Co.
Westinghouse E. & M. Co.
- Coils, Choke and Kieking**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Coin Counting Machines**
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.
- Coin Sorting Machines**
Cleveland Fare Box Co.
- Coin Wrappers**
Cleveland Fare Box Co.
- Commutator Slotters**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Commutator Truing Devices**
General Electric Co.
- Commutators or Parts**
Cameron Elec. Mfg. Co.
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.
- Compressors, Air**
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
- Compressors, Air Portable**
Ingersoll-Rand Co.
- Concrete Reinforcing Bars**
Laclede Steel Co.
- Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
- Condenser Papers**
Irvington Varnish & Ins. Co.
- Connectors, Solderless**
Westinghouse E. & M. Co.
- Connectors, Trailer Car**
Elec. Service Supplies Co.
Ohio Brass Co.
- Controllers or Parts**
General Electric Co.
Westinghouse E. & M. Co.
- Controller Regulators**
Elec. Service Supplies Co.
- Controlling Systems**
General Electric Co.
Westinghouse E. & M. Co.
- Converters, Rotary**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Copper Wire**
Asaconda Copper Mining Co.
- Cord, Bell, Trolley, Register**
Brill Co., The J. G.
Elec. Service Supplies Co.
Internatl Register Co., The
Roebing's Sons Co., J. A.
St. Louis Car Co.
Samson Cordage Works
- Cord Connectors and Couplers**
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
- Couplers, Car**
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
- Cross Arms (See Brackets)**
- Crossing Foundations**
International Steel Tie Co.
- Crossings**
Ramapo Ajax Corp.
- Crossing Signals (See Signals, Crossing)**
- Crossing, Frog & Switch**
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.
- Crossing Manganese**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Crossings, Track (See Track, Special Work)**
- Crossings, Trolley**
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
- Curtains and Curtain Fixtures**
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.
- Dealer's Machinery**
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equip. Co.
- Derailing Devices (See also Track Work)**
Wharton, Jr., & Co., Wm.
- Derailing Switches, Tee Rail**
Ramapo Ajax Corp.
- Detective Service**
Wish-Service, P. Edward
- Doors & Door Fixtures**
Hale-Kilburn Co.
- Door Operating Devices**
Brill Co., The J. G.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
- Doors, Folding Vestibule**
Nat'l Pneumatic Co., Inc.
- Drills, Track**
Amer. Steel & Wire Co.
Elec. Service Snp. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
- Dryers, Sand**
Elec. Service Supplies Co.
- Ears**
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
- Electrical Wires and Cables**
Amer. Electrical Works
Roebing's Sons & Co., J. A.
- Electric Grinders**
Railway Track-work Co.
- Electrodes, Carbon**
Railway Track-work Co.
- Electrodes, Steel**
Railway Track-work Co.
- Engineers, Consulting, Consulting and Operating**
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Buchanan & Layne Corp.
Bureau of Comm. Economics, Inc.
Dylleby & Co., H. M.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe R.
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., D. P.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.
- Engines, Gas, Oil or Steam**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
- Exterior Side Panels**
Haskelite Mfg. Co.
- Fare Boxes**
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.
- Fences, Woven Wire and Fence Posts**
Amer. Steel & Wire Co.
- Fenders and Wheel Guards**
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.
Star Brass Works
- Fibre and Fibre Tuhing**
Westinghouse E. & M. Co.
- Field Coils (See Coils)**
- Flangeway Guards, Steel**
W. S. Godwin Co., Inc.
- Fluxinum Insulation**
Nat'l Ry. Appliance Co.
- Floodlights**
Elec. Service Supplies Co.
- Frogs & Crossings, Tee Rail**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Frogs, Track (See Track Work)**
- Frogs, Trolley**
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
- Funnel Castings**
Wm. Wharton, Jr. & Co., Inc.
- Fuses and Fuse Boxes**
General Electric Co.
Westinghouse E. & M. Co.
- Fuses, Refillable**
General Electric Co.
- Gaskets**
Westinghouse Tr. Br. Co.
- Gas-Electric Cars**
General Electric Co.
- Gas Producers**
Westinghouse E. & M. Co.
- Gates, Car**
Brill Co., The J. G.
St. Louis Car Co.
- Gear Blanks**
Bethlehem Steel Co.
- Gear Cases**
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
- Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.
- Generating Sets, Gas-Electric**
General Electric Co.
- Generators**
Allis-Chalmers Mfg. Co.
General Electric Co.
Leeco-Neville Co.
Westinghouse E. & M. Co.
- Girders**
Bethlehem Steel Co.
Lorain Steel Co.
- Gong (See Bells and Gongs)**
- Greases (See Lubricants)**
- Grinders and Grind, Supplies**
Railway Track-work Co.
- Grinders, Portable**
Buda Company
Railway Track-work Co.
- Grinders, Portable Electric**
Railway Track-work Co.
- Grinding Blocks and Wheels**
Railway Track-work Co.
- Guard Rail Clamps**
Ramapo Ajax Corp.
- Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.
- Guards, Trolley**
Elec. Service Snp. Co.
Ohio Brass Co.
- Hammers, Pneumatic**
Ingersoll-Rand Co.
- Harpa, Trolley**
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
- Nuttall Co., R. D. & Co.**
Star Brass Works
- Headlights**
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
- Headlining**
Haskelite Mfg. Co.
Panelyte Co.
- Heaters, Car (Electric)**
Gold Car Heat. & Light. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter
- Heaters, Car, Hot Air and Water**
Elec. Service Snp. Co.
Smith Heater Co., Peter
- Helmet—Welding**
Railway Track-work Co.
- Hoists, Portable**
Ingersoll-Rand Co.
- Hydraulic Machinery**
Allis-Chalmers Mfg. Co.
- Ignition Units**
Leeco-Neville Co.
- Instruments, Measuring, Testing and Recording**
Elec. Service Snp. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Insulating Cloth, Paper and Tape**
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.
- Insulating Silk**
Irvington Varnish & Ins. Co.
- Insulating Varnishes**
Irvington Varnish & Ins. Co.
- Insulation (See also Paints)**
Electric Ry. Equipment Co.
Elec. Service Snp. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Westinghouse E. & M. Co.
- Insulation Slot**
Irvington Varnish & Ins. Co.
- Insulators (See also Line Material)**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hemphill & Wells
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Insulator Pins**
Elec. Service Supplies Co.
Hubbard & Co.
- Jacks (See also Cranes, Hoists and Lifts)**
Elec. Service Supplies Co.
- Joints, Rail (See Rail Joints)**



A four-tool pneumatic tamping gang at work on a track repair job

Pneumatic Tie Tamping

The most efficient and economical way to tamp track

Ingersoll-Rand Pneumatic Tie Tampers speed-up track tamping. Four men with these machines will tamp more track and do a much better job than twelve to sixteen men working with hand picks and bars. And the track stands up two to three times longer than when tamped by hand.

Ingersoll-Rand Portable Air Compressors, for tie tamping service, makes possible other savings through the use of air operated Paving Breakers, Rail Drills, Woodborers, Spike Drivers, Grinders, etc. Ask for complete information on the uses and savings of these portable compressors — the tamping outfits.

INGERSOLL-RAND COMPANY-11 BROADWAY, NEW YORK CITY.

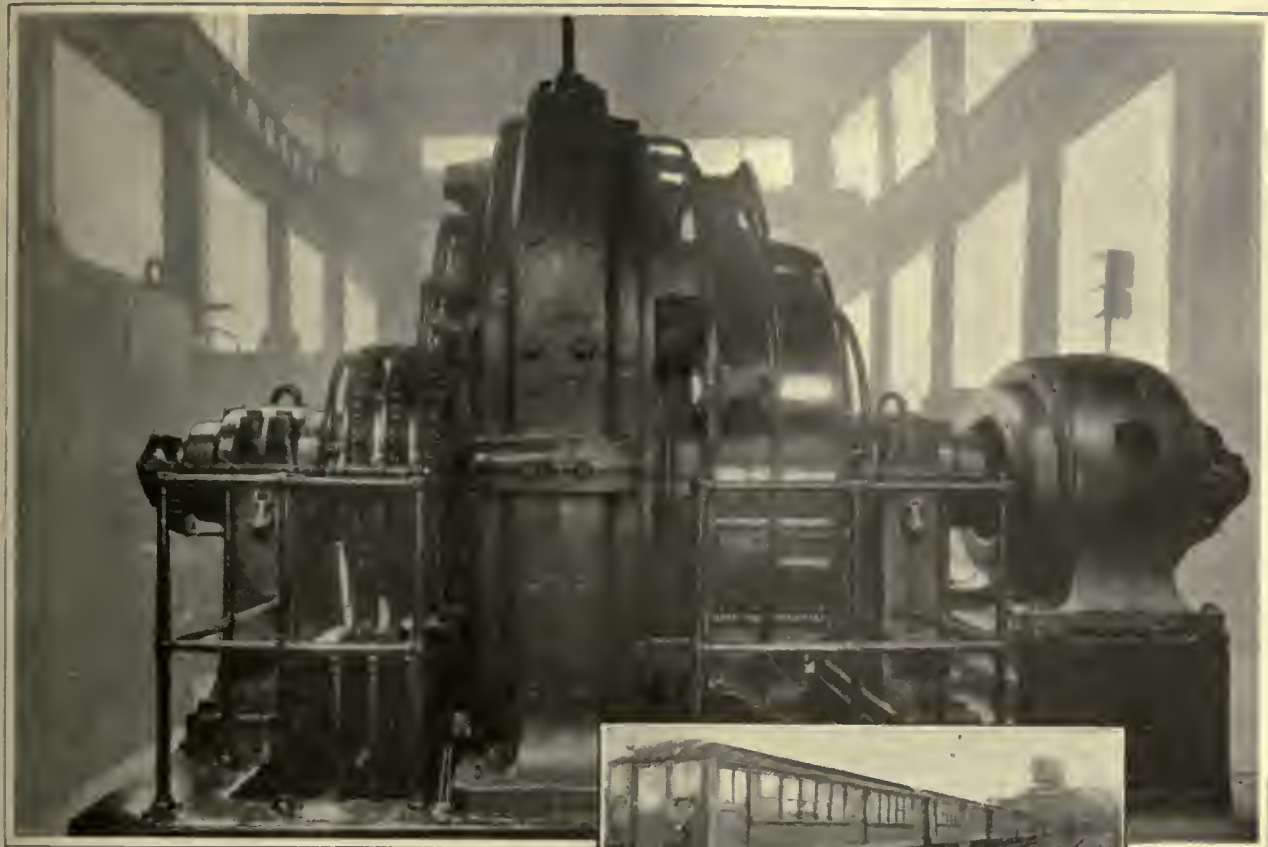
Offices in principal cities the world over

FOR CANADA REFER-CANADIAN INGERSOLL-RAND CO. LIMITED, 260 ST. JAMES STREET, MONTREAL, QUEBEC.

Ingersoll-Rand

- Journal Boxes**
Bemis Car Truck Co.
Brill Co., J. G.
St. Louis Car Co.
- Junction Boxes**
Horne & Ebling Corp.
Std. Underground Cable Co.
- Lamps, Guards and Fixtures**
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Arc and Incandescent**
(See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Signal and Marker**
Nichols-Lintern Co.
- Lanterns, Classification**
Nichols-Lintern Co.
- Lighting Systems**
Leece-Neville Co.
- Lightning Protection**
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.
- Line Material (See also Brackets, Insulators, Wires, etc.)**
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Locking Spring Boxes**
Wm. Wharton, Jr. & Co., Inc.
- Locomotives, Electric**
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
- Locomotives, Oil Engine, Electric Driven**
Ingersoll-Rand Co.
- Lubricating Engineers**
Universal Lubricating Co.
- Lubricants, Oil and Grease**
Universal Lubricating Co.
- Machinery, Insulating**
Amer. Insulating Mach. Co.
- Manganese Steel Castings**
Wm. Wharton, Jr. & Co., Inc.
- Manganese Steel Guard Rails**
Ramapo Ajax Corp.
- Manganese Steel Switches, Frogs & Crossings**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Manganese Steel, Special Track Work**
Bethlehem Steel Co.
Wm. Wharton, Jr. & Co., Inc.
- Meters (See Instruments)**
Mica
Mica Insulator Co.
- Molding, Metal**
Allis-Chalmers Mfg. Co.
- Motor Buses (See Buses, Motor)**
- Motors, Electric**
Westinghouse E. & M. Co.
- Motors and Generator Sets**
General Electric Co.
- Motormen's Seats**
Allis-Chalmers Mfg. Co.
Brill Co., J. G.
Elec. Service Sup. Co.
Hale-Kilburn Co.
Wood Co., Chas. N.
- Nuts and Bolts**
Barbour Stockwell Co.
Bethlehem Steel Co.
Bemis Car Truck Co.
Hubbard & Co.
- Oils (See Lubricants)**
- Omnibuses (See Buses, Motor)**
- Oxy-Acetylene (See Cutting Apparatus Oxy-Acetylene)**
- Oxygen**
International Oxygen Co.
- Paints and Varnishes (Insulating)**
Mica Insulator Co.
National Ry. Appliance Co.
- Pavement Breakers**
Ingersoll-Rand Co.
- Paving Brick Vitrified**
Nat'l Paving Brick Mfrs. Ass'n.
- Paving Guards, Steel**
W. S. Godwin Co., Inc.
- Paving Material**
Amer. Br. Shoe & Fdy. Co.
- Pickups, Trolley Wire**
Elec. Service Supplies Co.
Ohio Brass Co.
- Pinion Pullers**
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.
- Pinions (See Gears)**
- Pins, Case Hardened, Wood and Iron**
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.
- Pipe Fittings**
Westinghouse Tr. Brake Co.
- Planers (See Machine Tools)**
- Plates for Tee Rail Switches**
Ramapo Ajax Corp.
- Pliers, Rubber Insulated**
Elec. Service Sup. Co.
- Pneumatic Tools**
Ingersoll-Rand Co.
- Pole Line Hardware**
Bethlehem Steel Co.
Ohio Brass Co.
- Poles, Metal Street**
Bates Expanded Steel Truss Co.
Elec. Ry. Equipment Co.
Hubbard & Co.
- Pole Reinforcing**
Hubbard & Co.
- Poles & Ties Treated**
Bell Lumber Co.
- Poles, Ties, Posts, Piling & Lumber**
Bell Lumber Co.
- Poles, Trolley**
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
Nuttall Co., R. D.
- Poles, Tubular Steel**
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
- Potholes**
Okonite Co.
- Power Saving Devices**
National Ry. Appliance Co.
- Pressure Regulators**
General Electric Co.
Westinghouse E. & M. Co.
- Pumps**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
- Pumps, Vacuum**
Ingersoll-Rand Co.
- Punches, Ticket**
Intern'l Register Co., The
Wood Co., Chas. N.
- Rail Braces & Fastenings**
Ramapo Ajax Corp.
- Rail Grinders (See Grinders)**
- Rail Joints**
Carnegie Steel Co.
Rail Joint Co.
- Rail Joints—Welded**
Lorain Steel Co.
- Rails Relaying**
L. E. Foster Co.
Hyman-Michaels Co.
- Rails, Steel**
Bethlehem Steel Co.
L. E. Foster Co.
Carnegie Steel Co.
- Railway Paving Guards, Steel**
Godwin Co., Inc., W. S.
- Railway Safety Switches**
Westinghouse E. & M. Co.
- Rail Welding**
Railway Track-work Co.
- Rattan**
Brill Co., The J. G.
Elec. Service Supplies Co.
Hale-Kilburn Co.
Wood Co., Chas. N.
- Reclaimers, Waste & Oil**
Oil & Waste Saving Machine Co.
- Registers and Fittings**
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Rooke Automatic Register Co.
St. Louis Car Co.
- Reinforcement, Concrete**
Amer. Steel & Wire Co.
- Repair Shop Appliances (See also Coil Banding and Winding Machines)**
Elec. Service Supplies Co.
- Repair Work (See also Coils)**
General Electric Co.
Westinghouse E. & M. Co.
- Replacers, Car**
Elec. Service Sup. Co.
- Resistance, Wire and Tube**
General Electric Co.
Westinghouse E. & M. Co.
- Retrievers, Trolley (See Catchers and Retrievers, Trolley)**
- Rheostats**
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.
- Roofs**
Haskel Mfg. Co.
- Sanders, Track**
Brill Co., The J. G.
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.
- Sash Fixtures, Car**
Brill Co., The J. G.
Horne & Ebling Corp.
St. Louis Car Co.
- Sash, Metal, Car Window**
Hale-Kilburn Co.
- Scrapers, Track (See Cleaners and Scrapers, Track)**
- Screw Drivers, Rubber Insulated**
Elec. Service Sup. Co.
- Seats, Bus**
Hale-Kilburn Co.
Heywood-Wakefield Co.
- Seats, Car (See also Rattan)**
Brill Co., The J. G.
Hale-Kilburn Co.
- Seating Materials**
Brill Co., J. G.
Heywood-Wakefield Co.
St. Louis Car Co.
- Second Hand Equipment**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equip. Co.
- Shades, Vestibule**
Brill Co., The J. G.
- Shovels**
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.
Hubbard & Co.
- Slide Bearings (See Bearings Center and Side)**
- Signals, Car Starting**
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.
- Signals, Indicating**
Nichols-Lintern Co.
- Signal Systems, Block**
Elec. Service Sup. Co.
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
Wood Co., Chas. N.
- Signal Systems, Highway Crossing**
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
- Slack Adjusters (See Brake Adjusters)**
- Sleet Wheels and Cutters**
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
- Smokestacks, Car**
Nichols-Lintern Co.
- Snow-Flows, Sweepers and Brooms**
Brill Co., The J. G.
Consolidated Car Fender Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
- Soldering and Brazing Apparatus (See Welding Processes and Apparatus)**
- Special Adhesive Papers**
Irvington Varnish & Ins. Co.
- Special Trackwork**
Bethlehem Steel Co.
Buda Company
Lorain Steel Co.
- Spikes**
Amer. Steel & Wire Co.
- Splicing Compounds**
Westinghouse E. & M. Co.
- Splicing Sleeves (See Clamps and Connectors)**
- Springs, Car and Truck**
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
- Sprinklers, Track and Road**
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
- Steel Castings**
Wm. Wharton, Jr. & Co., Inc.
- Steel and Steel Products**
Morton Mfg. Co.
- Steps, Car**
Morton Mfg. Co.
- Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse E. & M. Co.
- Storage Batteries (See Batteries, Storage)**
- Strain, Insulators**
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
- Strand**
Roebbling's Sons Co., J. A.
- Superheaters**
Babcock & Wilcox Co.
- Sweepers, Snow (See Snow Flows, Sweepers and Brooms)**
- Switch Stands & Fixtures**
Ramapo Ajax Corp.
- Switches, Selector**
Nichols-Lintern Co.
- Switches, Tee Rail**
Ramapo Ajax Corp.
- Switches, Track (See Track Special Work)**
- Switches and Switchboards**
Allis-Chalmers Mfg. Co.
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Tampers, Tie**
Ingersoll-Rand Co.
Railway Track-work Co.
- Tapes and Cloths (See Insulating Cloth, Paper and Tape)**
- Tee Rail Special Track Work**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Telephones and Parts**
Elec. Service Supplies Co.
- Terminals, Cable**
Std. Underground Cable Co.
- Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**
- Thermostats**
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter
- Ticket Choppers & Destroyers**
Elec. Service Supplies Co.
- Ties, All Metal**
Metal Safety R.R. Tie Co.
- Ties and Tie Rods, Steel**
Barbour Stockwell Co.
Carnegie Steel Co.
Godwin Co., Inc., W. S.
International Steel Tie Co.
- Ties, Wood Cross (See Poles, Ties, Posts, etc.)**
- Tires**
U. S. Tire & Rubber Co.
Tongue Switches
Wm. Wharton, Jr. & Co., Inc.
- Tool Steel**
Bethlehem Steel Co.
- Tools, Track & Miscellaneous**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Hubbard & Co.
Railway Track-work Co.
- Torches, Acetylene (See Cutting Apparatus)**
- Tower Wagons & Auto Trucks**
McCardell & Co., J. R.
- Towers and Transmission Structures**
Archbold-Brady Co.
Bates Expanded Steel Truss Co.
Westinghouse E. & M. Co.
- Track Expansion Joints**
Wm. Wharton, Jr. & Co., Inc.
- Track Grinders**
Railway Track-work Co.
Rail Welding & Bonding Co.
- Trackless Trolley Cars**
St. Louis Car Co.
- Track, Special Work**
Barbour Stockwell Co.
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wharton, Jr. & Co., Inc., W.
- Transfer (See Tickets)**
- Transformers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Treads, Safety, Stair, Car Step**
Morton Mfg. Co.
- Trolley Bases**
Anderson Mfg. Co., A. J. & J. M.
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Ohio Brass Co.
- Trolley Bases, Retrieving**
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.
- Trolley Buses**
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.
- Trolley Material (Overhead)**
Bates Expanded Steel Truss
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
- Trolley Wheels (See Wheels, Trolley)**
- Trolley Wheel Bushings**
More-Jones Brass & Metal Co.
- Trolley Wheels & Harps**
More-Jones Brass & Metal Co.
- Trolley Wire**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebbling's Sons Co., J. A.
- Trucks, Car**
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
- Tubing, Yellow & Black, Flexible Varnish**
Irvington Varnish & Ins. Co.
- Turbines, Steam**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Turnstiles**
Elec. Service Supplies Co.
Percy Mfg. Co., Inc.
- Valves**
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Varnished Papers**
Irvington Varnish & Ins. Co.
- Varnished Silks**
Irvington Varnish & Ins. Co.
- Varnishes**
Beckwith-Chandler Co.
- Ventilators, Car**
Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
- Vestibule Linings**
Haskel Mfg. Co.
- Vitrified Paving Brick**
Nat'l Paving Brick Mfrs. Ass'n.
- Waste Saving Machines**
Oil & Waste Saving Machine Co.
- Welded Rail Joints**
Alumino-Thermic Corp.
Electric Railway Improvement Co.
Ohio Brass Co.
Railway Track-work Co.
- Welders, Portable Electric**
Electric Railway Improvement Co.
Ohio Brass Co.
Railway Track-work Co.
- Welding & Cutting Tools**
International Oxygen Co.
- Welding Processes and Apparatus**
Alumino-Thermic Corp.
Electric Railway Improvement Co.
General Electric Co.
International Oxygen Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.
- Welding Steel**
Electric Railway Improvement Co.
Railway Track-work Co.
- Wheel Guards (See Fenders and Wheel Guards)**
- Wheel Presses (See Machines Tools)**
- Wheels, Car Steel & Steel Tire**
Carnegie Steel Co.
- Wheels, Trolley**
Elec. Ry. Equipment Co.
Gilbert & Sons, B. F. A.
- Wheels, Trolley, Wrought Steel**
Elec. Service Supplies Co.
General Electric Co.
Nuttall Co., R. D.
- Whistles, Air**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Wire Rope**
Amer. Steel & Wire Co.
Roebbling's Sons Co., J. A.
- Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Roebbling's Sons Co., J. A.
Std. Underground Cable Co.
Westinghouse E. & M. Co.

One of the I. R. T. rotaries—NCC-259 on the DC side, Ringsdorf on the AC, for reliable, uninterrupted service



Where the nickel rides farthest

FOR a nickel one can ride from Brooklyn to Harlem on the Interboro Rapid Transit lines—the biggest nickel's worth in transportation today, given to the largest crowds by the longest trains, and with the aid of National Pyramid Brushes that have demonstrated their complete fitness for severe traction motor service.

In supplying power for these traction motors the rotary converter pictured here uses National Grade 259 Brushes on the DC side, Ringsdorf on the AC.

Peak after peak, day and night, these brushes help guarantee the remarkable service rendered by the I. R. T.

For I. R. T. service is a series of peaks. Morning workers—baseball fans—convention crowds—matinee-goers—evening home-seekers—two theatre rushes nightly—these are some of the I. R. T. daily responsibilities which require the utmost reliability in equipment.

Our Sales Engineers are at your service.

National Pyramid Brushes

Manufactured and guaranteed by

NATIONAL CARBON COMPANY, INC.
Cleveland, Ohio Carbon Sales Division San Francisco, Cal.

Canadian National Carbon Co., Limited, Toronto, Ontario

Emergency Service Plants

PITTSBURGH, PA.:
7th Floor, Arratt Power Bldg. No. 3, Barker Place
Phone: ATLantic 5570

NEW YORK, N. Y.: 237 East 41st St.
Phone: VANDerbilt 0425

CHICAGO, ILL.: 551 West Monroe St.
Phone: STAt 6092

ALPHABETICAL INDEX TO ADVERTISEMENTS

A	Page		Page		Page		Page
Allis-Chalmers Mfg. Co.	33	Electric Railway Equipment Co.	31	K		R	
Allison & Co., J. E.	20	Electric Railway Improvement Co.	34	Kuhlman Car Co.	43	Railway Audit & Inspection Co.	20
Alumino-Thermic Corp.	33	Electric Service Supplies Co.	9			Railway Track-work Co.	4
American Appraisal Co.	18			L		Railway Utility Co.	36
Amer. Brake Shoe & Fdy. Co.	35	F		Leece-Neville Co.	15	Ramapo-Ajax Co.	33
American Car Co.	43	Fageel Motors Co.	14	Le Carbone Co.	35	Riehey, Albert S.	20
American Electrical Works.	30	Ford, Bacon & Davis.	20	Long Co., E. G.	32	Robinson Co., Dwight P.	20
American Insulating Mach. Co.	30	"For Sale" Ads.	37	Lorain Steel Co.	31	Roebling's Sons Co., John A.	30
American Steel & Wire Co.	31	Fort Pitt Spring & Mfg. Co.	34			Rooke Automatic Register Co.	34
Anaconda Copper Mining Co.	30	Foster Co., L. B.	27				
Anderson Mfg. Co., A. & J. M.	21			M		S	
Archheld-Brady Co.	21	G		McCardell Co., J. R.	33	Safety Car Devices Co.	10
Atlas-Lummlite Cement Co.	17	General Electric Co., 18. Back Cover		McGulre-Cummings Mfg. Co.	35	Samson Cordage Works	32
		Godwin Co., Inc., W. S.	34	Mica Insulator Co.	33	Sanderson & Porter	20
B		Gold Car Heating & Ltg. Co.	34	More-Jones Brass & Metal Co.	30	Searchlight Section	37
Babcock & Wilcox Co.	31			Morton Mfg. Co.	42	Shaw, Henry M.	30
Barbour-Stockwell Co.	31	H				Smith Heater Co., Peter.	32
Bates Expanded Steel Truss Co.	6	Hale-Kilburn Co.	34	N		Standard Underground Cable Co.	30
Beeler Organization	20	Haskell Mfg. Co.	34	Nachod Signal Co., Inc.	30	Star Brass Works	35
Bell Lumber Co.	42	"Help Wanted" Ads.	37	National Brake Co.	19	Stevens & Wood, Inc.	20
Bemla Car Truck Co.	34	Hemphill & Wells	20	National Carbon Co.	41	Stone & Webster	20
Bethlehem Steel Co.	31	Holst, Englehardt W.	20	National Paving Brick Mfrs.		Stuckl Co., A.	42
Brill Co., The J. G.	43	Herne & Ebling, Corp.	32	Asm.	23		
Buchanan & Layng Corporation.	21	Hubbard & Co.	30	National Pneumatic Co., Inc.	11	T	
Bureau of Com. Economics, Inc.	21	Hyman-Michaels Co.	37	National Railway Appliance Co.	32	Tool Steel Gear & Pinion Co.	
Byllesby Co., H. M.	20			Nichols-Lintern Co.	33	The	36
		I		Nuttall Co., R. D.	29	Transit Equip. Co.	37
C		Ingersoll-Rand Co.	39	O			
Cameron Electric Mfg. Co.	33	International Motor Co.	12-13	Ohio Brass Co.	5	U	
Carnegie Steel Co.	32	International Oxygen Co.	33	Oil & Waste Saving Machine Co.	32	Universal Lubricating Co.	35
Chillingworth Mfg. Co.	42	International Register Co., The.	34	Okonite Co., The.	32	U. S. Electric Signal Co.	30
Cleveland Fare Box Co.	34	International Steel Tie Co.	7	Ong, Joe R.	21	U. S. Tire Co.	Front Cover
Collier, Inc., Barron G.	22	Irrington Varnish & Insulator Co.	32				
Consolidated Car Fender Co.	24			P		W	
Consolidated Car Heating Co.	25	J		Panelty Co.	30	"Want" Ads	37
		Jackson, Walter	20	Perey Mfg. Co., Inc.	34	Wason Mfg. Co.	43
D		Jeandron, W. J.	35	Positions Wanted and Vacant.	37	Westinghouse Electric & Mfg.	
Dayton Mech. Tie Co.	20	Johnson & Co., J. R.	42			Co.	2
Day & Zimmermann, Inc.	20	Johnson Fare Box Co.	34			Westinghouse Traction Brake Co.	8
Differential Steel Car Co., The.	36					White Engineering Corp., J. G.	20
Drum & Co., A. L.	21					Wharten, Jr., & Co., Wm.	26
						Wish Service, The P. Edw.	21
E						Wood Co., Chas. N.	30
Earl, C. I.	30						
Electric Equipment Co.	37						



CHILLINGWORTH

One-Piece Gear Cases
Seamless—Riveted—Light Weight
Best for Service—Durability and Economy. Write Us.

Chillingworth Mfg. Co.
Jersey City, N. J.

Only reliable products
can be continuously
advertised

100 New Users in the Last Nine Months
KASS SAFETY TREADS

HIGH
in efficiency and lasting qualities
LOW

in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago

"Axle Specialists Since 1866"

Address all Mail to Post Office Box 515, Richmond, Va.

CAR AXLES

J. R. JOHNSON AND CO., INC.

FORGED STEEL AXLES

For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or
Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large
Shafts, Round Bars, etc.

Northern **CEDAR POLES** Western

We guarantee
all grades of poles; also any butt-treating specifications

BELL LUMBER COMPANY
Minneapolis, Minn.



**STUCKI
SIDE
BEARINGS**

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.



LIGHT-WEIGHT "WINNER TYPE"

Brill Seats

**For Both
Railway
and
Bus Service**



"CUMFIT" BUS TYPE

The reason why Brill Seats stand up so well in railway service is because they are put together right; the character of service is taken into consideration.

That's also the reason why Brill Bus Seats so satisfactorily

meet service conditions. The "Cumfit" Seat illustrated is but one of many types specially developed for bus service; maximum comfort and durability are among its important characteristics.

Information on all types of seats furnished upon request

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO.
ST. LOUIS, MO.

G. C. KUHLMAN CAR CO.
CLEVELAND, OHIO.

WASON MANF'G CO.
SPRINGFIELD, MASS.



THE LARGEST ORDER GREW STILL LARGER

RAILWAY men will recall that the GE-275 Motor was "chosen on merit for Philadelphia's record-breaking car order"—in 1923.

For 100 more new cars ordered recently, the Philadelphia Rapid Transit Company specified the same Motor, with K-68 Control, making the total number of GE-275 Motors for that system now 1280.

Such dependence placed in the GE-275 Motor implies confidence on the part of railway engineering authorities in its serviceability.

GENERAL ELECTRIC¹¹⁻⁴
GENERAL ELECTRIC COMPANY, SCHENECTADY, NEW YORK

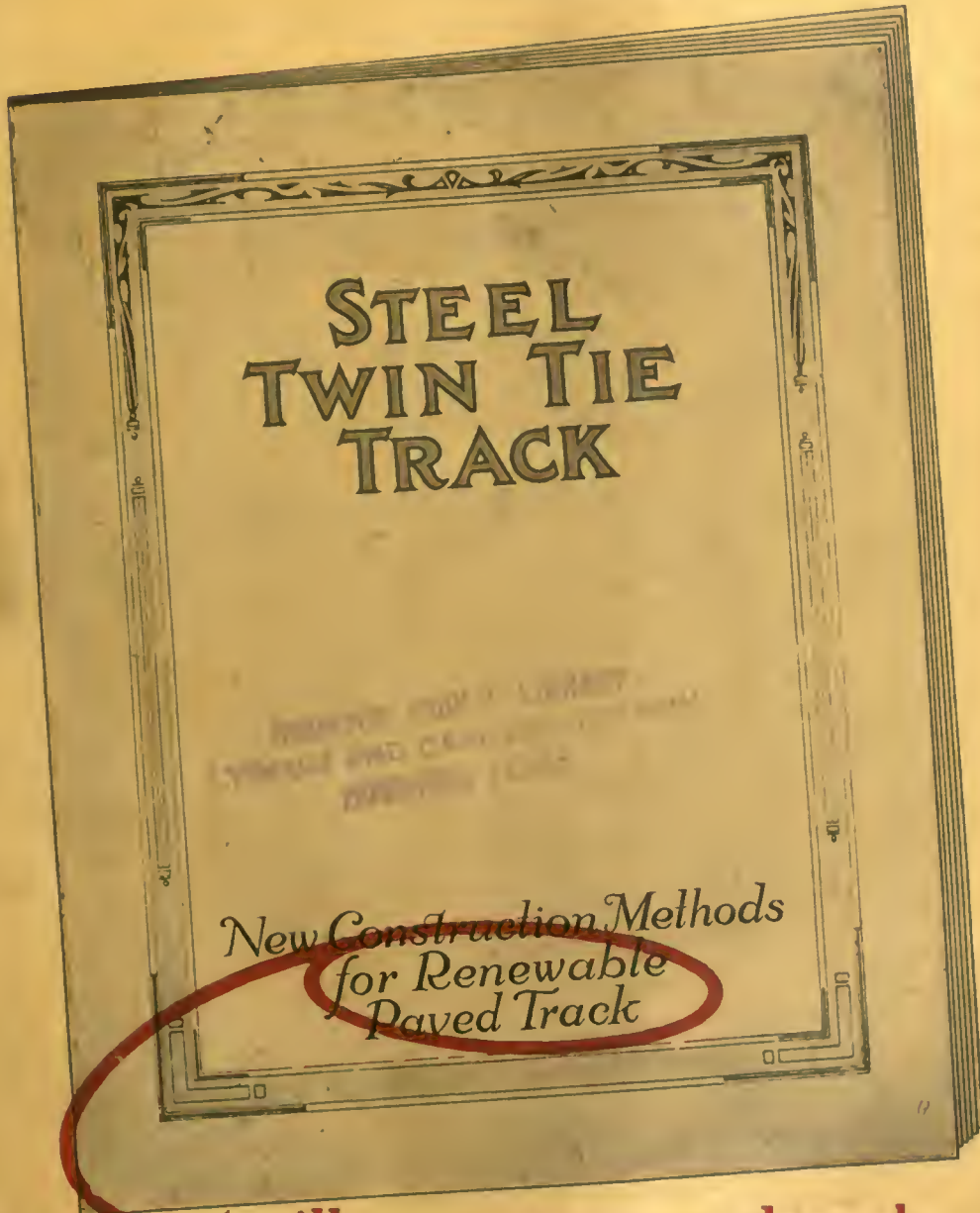
MAINTENANCE ISSUE

ELECTRIC RAILWAY JOURNAL

McGraw-Hill Company, Inc.

Twenty Cents Per Copy

February 28, 1925



If your name is on our mailing list, this new catalog has been mailed to you. Extra copies have been reserved for all others interested. We will be pleased to send you one on receipt of your address.

THE INTERNATIONAL
STEEL TIE CO.
Cleveland, Ohio

(will your new paved track
be renewable?)

Steel Twin Tie Track

Renewable Track . . . Permanent Foundation

Selling By Serving



THE fifty new cars, now being placed in service by the Pacific Electric Railway, Los Angeles, are similar to the one hundred cars of this type which have been so successfully meeting the requirements of Los Angeles suburban routes.

These cars are of the light-weight, low-floor

type, arranged for train operation, designed to give a fast and attractive service with the minimum cost of operation. They are all equipped with Westinghouse quadruple 50 hp. motors and low-floor "HL" control which are giving the remarkable operation inherent to this type of equipment.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries



Westinghouse

X 79735

JOHN A. MILLER, Jr.
Associate Editor
C. W. SQUIER
Associate Editor
O. J. MACMURRAY
News Editor

ELECTRIC RAILWAY
JOURNAL

MORRIS BUCK, Managing Editor

HENRY W. BLAKE
Senior Editor
CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

CONTENTS

FEBRUARY 28, 1925

Editorials	323
Maintaining Car Springs in Twin Cities.....	325
Proper maintenance of springs is considered to be an important item in improving the riding quality of cars, keeping down step heights and reducing noise and general wear and tear on equipment.	
Wheel Maintenance Practice in Denver.....	327
Specialized Inspection Reduces Pull-Ins on Kansas City Railways	329
Designation of certain trained men to do inspection work exclusively has resulted in eliminating many street failures. Cars are inspected both before and after the work is done and each man is held responsible for the group of cars assigned to him.	
Old Rail Used for Ties in Bangor.....	333
By E. W. JENNISON. Rigid reinforced concrete track and paving construction is employed. Wood ties are alternated with steel ties, which are welded to the base of the running rail. Joints are thermit welded.	
Jigs Expedite Multiple Drilling	335
Oxyacetylene Torch Used to Good Advantage in Omaha.....	336
New Cyanide Hardening Process in Chicago Shops.....	337
Electrical Equipment Causes Big Saving.....	338
Comparative data from the Chicago, Milwaukee & St. Paul Railway show definite economy from electrical operation on both electrified divisions, though traffic conditions differ greatly.	
German Comment on Foreign Practice Report.....	341
Equipment Maintenance Notes	342
New Equipment Available	345
Association News and Discussions	347
Southern Equipment Men Meet in Dallas.....	347
Ways to reduce the number of pull-ins, car painting, education of mechanical employees, and motor maintenance were among the subjects discussed.	
American Association News	348
News of the Industry	349
Financial and Corporate	354
Personal Mention	357
Manufactures and the Markets	359

McGRAW-HILL COMPANY, INC.

Tenth Avenue at 36th Street, New York

JAMES H. McGRAW, President
ARTHUR J. HALLWIN, Vice-President
MALCOLM MEIR, Vice-President
E. J. MEHLEN, Vice-President
MARION BRITTON, Vice-President
JAMES H. McGRAW, Jr., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary

WASHINGTON:
Colorado Building
CHICAGO:
Old Colony Building
PHILADELPHIA:
Real Estate Trust Building
CLEVELAND:
Leader-News Building
ST. LOUIS:
Star Building
SAN FRANCISCO:
883 Mission Street

LONDON:
4 Houveris Street, London, E. C. 4
Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations



Cable Address: "Machinist, N. Y."

Publishers of
Engineering News-Record
American Machinist
Power
Chemical and Metallurgical Engineering
Coal Age
Engineering and Mining Journal-Press
Ingeniero Internacional
Bus Transportation
Electric Railway Journal
Electrical World
Electrical Merchandising
Radio Installing
Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
American Machinist—European Edition
(Published in London)

The annual subscription rate is \$1 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries \$2 (total \$3 or \$4 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 25 cents.
Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.
Copyright, 1925, by McGraw-Hill Company, Inc.
Published weekly. Entered as second-class matter, June 23, 1909, at the Post Office at New York, under the Act of March 3, 1879. Printed in U.S.A.

Your Language

A LAWYER who becomes attorney for a railway remains primarily a lawyer. So also a doctor who does medical work for a railway is nevertheless a doctor still. But an engineer engaged in the publication of a railway magazine should be first of all a railway man. Every one of the technical editors of the ELECTRIC RAILWAY JOURNAL is an engineer. Yet it is not primarily as engineering that they consider their job—nor is it editorial work either. Theirs is railway work and they are railway men.

Every question requiring editorial consideration is viewed from the standpoint of the railway man. In this way the practices and ideas of the industry as described in the pages of the JOURNAL reflect the views of men thoroughly familiar and in sympathy with it.

Apparently the men of the industry understand this, for the average railway man in talking with an editor of this paper plunges right to the heart of his subject without preliminary explanations. Of course no one can know everything about every phase of the industry, but the editors of the JOURNAL have had first-hand experience in the railway game and they talk and understand the railway language.



High Speed with Safety

The bus that can "get there" quickly with an assurance of safety, wins the patronage of the riding public, and operates at the greatest profit.

The ordinary foot-pressure brake uses up the physical energy of the driver and consumes valuable time in making stops.

Westinghouse Automotive Air Brakes save time in bringing a car to a stop or slowing it down. They permit short stops to be made smoothly without discomfort to passengers or danger of skidding. This means better running time.

To provide quicker and safer bus transportation for your patrons, use Westinghouse Automotive Air Brakes.



The benefits of buses equipped with Westinghouse Air Brakes are now being realized by eighteen prominent Street Railways.

WESTINGHOUSE TRACTION BRAKE CO.

Automotive Division, Wilmerding, Pa.





ZP



WDS

For City

and Suburban Cars

These two Imperial Headlights are representative of listings for two classes of city service.

The ZP is a neat, flush type design with metal reflector for a marker for city cars where extensive track illumination is not necessary or desired.

The WDS has a metal reflector and is arranged for good illumination in the outlying districts yet can be dimmed for use in the city.

Complete details as to reflectors, standard and special lenses, door locks and lamp bulbs will be found in Imperial Catalog No. 210.

The Ohio Brass Co.
Mansfield, Ohio

B
PRODUCTS



Quality

ABOVE ALL ELSE

THE term *International* Quality has a particular significance in the tie field. It represents that absolute dependability which eliminates chance from tie buying.

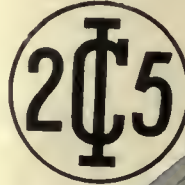
International Tie Quality stands for sound timber, quick removal of the ties from woods, accurate grading, thorough seasoning, and effective treatment with high grade preservatives.

Every *International* Tie is trademarked permanently with an *International* dating nail. This nail is a practical guarantee, assuring the tie buyer that every phase in the production, seasoning and treatment has been carefully carried out. The *International* purpose is not simply to sell ties, but to excel in every way possible.

International Creosoting & Construction Co.

General Offices—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas





KEYSTONE COMPENSATING FIXTURES

**On the East Boston Tunnel Cars
operated by the Boston Elevated Railway Co.**

Only one lighting circuit, down the center of the aisle, is needed. Only five powerful lamps are required. Only an occasional lamp replacement becomes necessary. Yet there is ample illumination, less current is consumed, and the appearance is most attractive.

Keystone Compensating Fixtures constitute the modern idea in car illumination. The patented "compensating" principle automatically cuts out any burnt-out lamp, and the remaining four continue to burn on the series circuit.

Write for complete data.

ELECTRIC SERVICE SUPPLIES Co.

PHILADELPHIA
17th and Cambria Sts.
PITTSBURGH
629 Oliver Building

NEW YORK
50 Church St.
SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.
BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver





In Further Reference to Our Message of January 31

in which we announced our newly established Chicago office in Suite 1736, 310 South Michigan Boulevard, corner Jackson Boulevard, we now carry in stock exceptionally large quantities of all

OKONITE PRODUCTS *in Our Chicago Warehouse*

We also have adequate facilities for taking care of immediate stock shipments from that point.

In view of the demand for prompt shipping service on

WIRES AND CABLES *of Special Construction*

we shall be glad to carry these in stock to meet emergency requirements, if you will indicate your especial needs.

Save time by phoning HARRISON 8660

THE OKONITE COMPANY

INCORPORATED 1884

THE OKONITE-CALLENDER CABLE COMPANY, Inc.
PASSAIC, NEW JERSEY

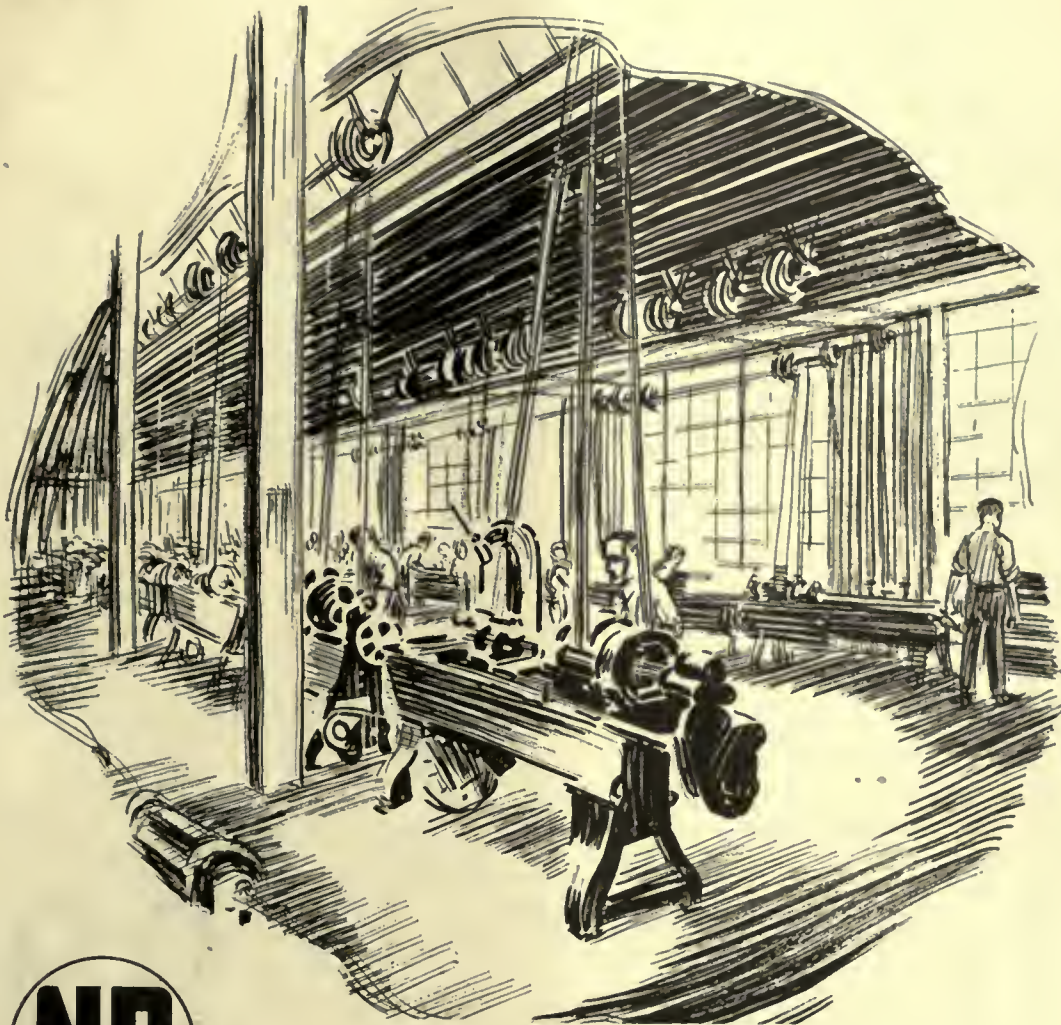
Sales Offices { New York • Chicago • Pittsburgh • St. Louis
Atlanta • Birmingham • San Francisco

F. D. Lawrence Electric Co., Cincinnati, O.

Novelty Electric Co., Philadelphia, Pa.

Pettingell-Andrews Co., Boston, Mass.

Canadian Representatives: Engineering Materials Limited, Montreal



Turret lathes in operation at the National Pneumatic Works in Rahway. In few other plants has so much care been taken to provide ideal working conditions while *no* other plant is exclusively devoted to production of pneumatic engines—the ideal tool for the operation of car doors and step—the device affording a mechanical solution to all traffic-handling problems.

NATIONAL PNEUMATIC COMPANY

Executive Office, 50 Church Street, New York

General Works, Rahway, New Jersey

CHICAGO
McCormick Building

MANUFACTURER IN
TORONTO, CANADA
Dominion Wheel & Foundries, Ltd.

PHILADELPHIA
Colonial Trust Building



*This was in New Orleans /
only 30 years ago. !*

Towers instead of Poles!

IT SEEMS scarcely credible, yet actual photographs show these huge skeleton towers 125 feet high in the Crescent City's streets in the early nineties. While horses still pulled the street cars, these towers were designed and built for carrying the earliest electric wires. The refusal of electric companies to replace their wires on these towers, caused the project to be abandoned.

In spite of early difficulties, New Orleans has become a banner city in many ways denoting the adoption of modern ideas and modern methods.

The street railway trolley wire system in New Orleans today, with the exception of one single mile out of over two hundred is modernized with Phono-Electric from end to end.

One typical instance reported shows the extraordinary wearing service of Phono-Electric. Whereas hard-drawn copper trolley, formerly used on Canal Street gave a life of about 8 months, Phono-Electric lasts three years under the same or heavier traffic.

 **Bridgeport**
Brass Company
BRIDGEPORT - CONNECTICUT
NEW YORK PHILADELPHIA CHICAGO DETROIT

99%

of New Orleans is

"Bridgeport"
TRADE CO. MARK
Phono-Electric

the record installation
of Phono-Electric
on a large American
city electric railway

Phono-Electric



Standardization—*accomplished!*

IN AN era of experimentation, changing models and new equipment, one fact stands unchallenged—the established success of the standardized Type L, double-deck Fifth Avenue Bus.

Improved, yes! Strengthened—yes! But in its essential characteristics of design and construction, style and assembly the newest 55-passenger Fifth Avenue Double Deck Bus is not radically different from the first L Type buses built by us.

Users, in 10 different cities, do not have to keep extensive stocks of parts for different models. They do not have to contend with new maintenance problems. For them, standardization has resulted in an economy and reliability unequalled in motor-bus practice.

When planning on motor-bus operation, weigh well the operating and financial advantages of standardized, time-tried, proved equipment.



FIFTH AVENUE BUSES

*No. 5 of a series showing
the utility of Mack Buses
during non-peak hours*

Shop



ping tours—

Going down town!

It isn't always a pleasant trip for Mrs. Citizen, what with changing cars, and jostling crowds, and waits at street corners.

How well appreciated by every man and woman in the community would be a special "shopping service" of luxurious Mack Buses operated during non-rush hours at a slightly higher fare rate?

And while building up invaluable goodwill, such a service at the same time provides a profitable means of keeping buses earning at full capacity when schedule traffic is at low ebb.

Leading electric railway men throughout the country are using proper coordination of bus and street car service as an aid to building revenue and increasing public goodwill.

In many cases of large installations, Mack

has been the choice of equipment. For the Mack Bus embodies all those features of design and construction so essential to economy in service of this kind;—a body built to permit rapid loading and unloading of passengers; an improved, powerful engine with quick "pick up"; easy gear-shift; adequate smooth-operating brakes.

There are other important Mack features too that every prospective bus operator should study carefully,—notably the Mack Shock Insulator Suspension by which bus chassis and body float on eight cushions of live rubber.

Let Mack engineers tell you the whole story

MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY

25 BROADWAY

NEW YORK CITY

Eighty-five direct MACK factory branches operate under the titles of "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION"

The Mack Bus



Sedan Type Bus

Performance counts!

Protect equipment-protect profits

Use IRVINGTON
BLACK and YELLOW
VARNISHED CAMBRIC

No matter how carefully chosen the material entering into the construction of electrical apparatus may be. No matter how perfect the design and expert the workmanship, efficiency depends first and last on the insulation.

Irvington Varnished Cambrics were introduced on a basis of greater insulating efficiency in 1905. They have consistently held this lead. The base cotton cloths entering into their manufacture are purchased on strict specification. All bleaching and finishing is done in our own plant, and splices are properly pasted—not sewed—before varnishing, thereby assuring practically continuous lengths. Constant and rigid electrical tests guarantee uniformity of electrical characteristics.



Wherever possible we recommended the use of Irvington Black Varnished Cambric as having greater heat resistance, dielectric strength, acid and alkali resistance, and better ageing qualities than the Yellow material.

Either Black or Yellow Varnished Cambric can be supplied with slightly greasy, "tacky" or dry finish as required.

Insulation Quality

Today the Irvington Varnish and Insulator Company is the largest producer in the World of flexible varnished insulations. The quality and performance of Irvington Products no longer rests on claims or theoretical tests but on the long practical experience of leaders in electrical industry who have specified "Irvington" consistently during the past twenty years.

Such established standards of quality constitute a real safeguard.



IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey.

Established 1905

Sales Representatives:

Mitchell-Rand Mfg. Co., New York
T. C. White Electrical Supply Co., St. Louis
E. M. Wolcott, Rochester

Prehler Bros., Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles

F. G. Scofield, Toronto



They Returned to Galena

THE high cost of low-priced oils is illustrated by the experience of an old-time Galena road.

Because of lower prices they switched to other oils. Oils that were conscientiously made but oils that lacked the life time of Galena experience in building lubricants for specific services.

As a result oil consumption rose until nearly double that with Galena lubricants.

Despite this flood of oil, maintenance costs increased more than the total oil bill.

The experiment ceased. The road returned to Galena lubricants and started off by re-packing their entire equipment with Galena Oils and Greases. Within a short time the road was back to normal.

These facts are a matter of record. The name of the road will be furnished in confidence to interested executives.



Galena-Signal Oil Company
 New York Franklin, Pa. Chicago
 and offices in principal cities





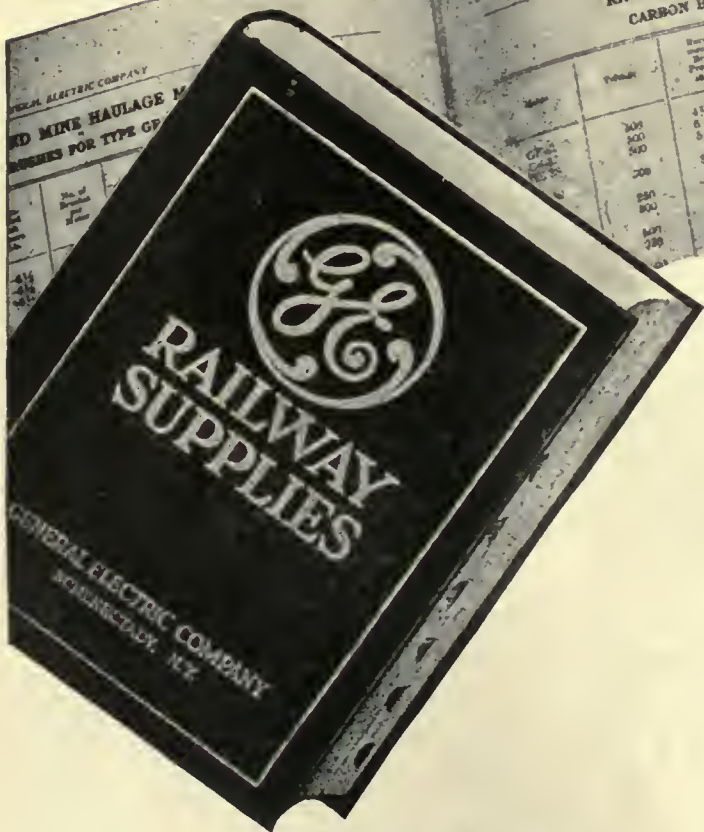
GENERAL ELECTRIC COMPANY

RAILWAY AND MINE HAULAGE MOTORS
CARBON BRUSHES FOR TYPE GE MOTORS

unreplaced in (hours)

Motor	Brushes	Brushes per Motor	Length	Width	Thickness	Col. No.
200	4-1/2-8	2	2 1/2	1 1/4	3/8	11347
300	6-8-8	2	3 1/2	1 1/4	3/8	42911
400	8-8-8	2	4 1/2	1 1/4	3/8	34070
500	10-8-8	2	5 1/2	1 1/4	3/8	42912
600	12-8-8	2	6 1/2	1 1/4	3/8	42913
700	14-8-8	2	7 1/2	1 1/4	3/8	42914
800	16-8-8	2	8 1/2	1 1/4	3/8	42915
900	18-8-8	2	9 1/2	1 1/4	3/8	42916
1000	20-8-8	2	10 1/2	1 1/4	3/8	42917

Several pages of this data in your G-E Catalog are provided to help you select the proper brush for your motors



**Your Text
Book
on
Equipment
Standards**

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

**“and nothing but the
best would do”**

G-E Brushes are founded upon the experience gained in observing the operation of millions of G-E Motors, thousands built for railway service every year.

The success of G-E Railway Motors themselves is evidence of the high standard reached and maintained in G-E Brushes. In fact, the Brushes were developed for the Motors, for *nothing but the best would do*.

By calling upon G-E Brush Specialists you can be sure of proper brush application. And by keeping your G-E Railway Motors equipped with G-E Brushes your “Original Equipment Quality” is maintained.



GENERAL ELECTRIC

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

MORRIS BUCK, *Managing Editor*

Volume 65

New York, Saturday, February 28, 1925

Number 9

Accurate Maintenance Costs Are Worth While

FROM a study of maintenance methods and practices in various shops, one is impressed by the lack of adequate cost figures. Questions regarding most of the technical phases of the work are readily answered, but accurate cost records are seldom available. This condition seems to be quite common except in some few shops where the master mechanic, apparently in sheer desperation, has set up a rough cost system of his own which enables him to judge to some extent in what direction he is headed.

Maintenance costs are collected in one form or another to compile the various accounts of the standard classification. The manner and degree to which they are utilized for the preparation of statements for the information of the maintenance departments determines whether or not this information becomes simply dead records or active guides and signals to direct the work of the maintenance forces.

The need for more detailed maintenance figures has been generally recognized. Last year a joint committee of the Engineering and Accountants' Associations prepared a tentative subdivision of the standard classification for the way and structures department. At the convention, however, this classification was questioned because it contained certain subdivisions to which it would be very difficult to make accurate charges. It was pointed out during the discussion of the report that it is difficult to get maintenance men to differentiate accurately between a large number of accounting subdivisions. This defeats the very purpose of the subdivision. It requires constant vigilance and supervision even to get charges made properly to the various accounts of the standard classification. An interesting pictorial guide made up by the Department of Street Railways of Detroit and described in the Aug. 16, 1924, issue of this paper, was devised to guide foremen and workmen in making such charges correctly.

There must be a definite purpose for an account subdivision to justify its use. Both in the shop and field it is important to avoid burdening maintenance forces with a top-heavy system of red tape. Mechanics should spend their time in productive work and not in keeping books or making out endless time tickets.

The need for detailed maintenance cost figures led to a decision to continue the work of the joint committee on engineering accounting, which is preparing a subdivision of the equipment group of accounts. This work might be carried still further to include a study of report forms designed to give the maintenance departments necessary cost information for their guidance in the most concise and intelligible form.

The extent to which subdivision is carried, and the

form in which reports are prepared, should be determined by the concrete purpose for which the information is compiled. In the shop, for instance, the cost statements, to be of maximum value, would show on the one hand the relative maintenance cost for the various types of each major part of the car equipment. Thus if this cost for any particular class of equipment or important part becomes excessive due to obsolescence or imperfect design, the fact will at once be apparent. In the same way, the master mechanic who is manufacturing replacement parts in the shop should know from time to time the cost of the parts so manufactured in comparison with their market price. With changing conditions, such statements will show whether it is cheaper to manufacture the parts or buy them outside.

When new equipment is to be purchased, accurate records of past performances are invaluable as a guide in the selection of the equipment best suited to the needs of a particular property and a particular service. The cost of a few additional clerks is small compared with the savings that can be made.

All of this requires the supervision of men versed in the principles of cost accounting, and who at the same time are in touch with the maintenance forces and are familiar with their needs and their problems. In practically every railway organization of considerable size there seems to be a place for the engineer-accountant. He becomes the connecting link between the accountant and the maintenance forces so that their work may be co-ordinated to the end that the necessary cost information will be available in a form best adapted to guide the administration of maintenance work.

Modernizing the Shopman's Point of View

ONE subject that always arouses interest when equipment men get together is the improvement in machines and processes for lowering maintenance cost and making equipment more reliable. The men who make these economies possible have not received much attention. But the efficiency of a machine is no greater than that of the man who operates it, as was pointed out at the recent Dallas meeting of the Electric Railway Association of Equipment Men, Southern Properties. This was the keynote of a commendable discussion on the question: How can the shopmen best be educated so as to increase the efficiency of their work? Vocational training courses, the reading of technical books and publications, conferences and discussions on timely topics were suggested as some of the means to this end.

It is of little avail to re-equip a railway shop with modern labor-saving machinery if the point of view of the shop employees remains the same as it was

20 or 30 years ago. Their thinking must be made as up to date as the tools they are using. There has been in the past too much of the "We've always done it this way" attitude. In most cases methods that were adopted in 1895 are as out of date in 1925 as a car built at that time would be today.

This need of modernizing the point of view of the men in the shops is now receiving considerable attention from railway managements. Opinions differ somewhat as to how it may best be accomplished. To a certain extent the method must depend upon the conditions in the particular shop where it is to be applied.

It is of primary importance, however, that the educational idea be properly "sold" to the shopman. A definite relation between the teaching and its results must be demonstrated. These men are not likely to be interested in ways to improve their minds simply for the sake of mental improvement. But they are intelligent men, and if they can be convinced that the educational program will make their work easier and better they will grasp the opportunity eagerly. The increasing attention being paid to this subject indicates that the electric railway industry will soon see a development in modernizing the shopmen's point of view similar to that which has already been made in modernizing the equipment in the shops of the more progressive companies.

Better Maintenance Will Reduce Noise in Car Operation

INCREASED attention is being given by electric railway officials to the problem of reducing noise in car operation. This can be considered as one of the details of modernization and will have a far-reaching effect in promoting better relations with the public.

Much of the noise in car operation is caused by parts which have been allowed to become loose or excessively worn. Loose truck parts, brake rigging, brakeshoes, and journal boxes, or worn motor suspensions, trolley wheels, springs, bearings, gears and pinions are parts that cause noise in operation. A second cause is the noise produced by impact between the car wheels and the rail. Such noises result from worn and corrugated rails, loose or broken joints, grit and dirt on the rails, flat wheels and wheels out of round. Moreover, jarring and vibrations from impact loosen car parts and eventually cause creaking at the body joints. Still a third major cause of noise is that originating in vibration of the operating and braking equipment itself.

Other factors contribute to car noises. Although they do not actually make the noise, they accelerate and transmit it instead of damping it. The susceptibility of parts to take up and transmit sound waves and vibrations introduces a problem in design that hitherto has not received great attention. Construction of track and roadway as well as of the cars themselves should be included. Surrounding buildings and equipment outside the track area sometimes add to the noise, on the principle of a sounding board.

The best way to reduce noise in the car equipment itself and in the track and roadway is by means of a higher grade of maintenance. Instead of keeping gears and pinions in service until they are worn so sharp that there is danger of breaking before they are removed, noise reduction requires that they be scrapped as soon as they wear to a point where excessive vibra-

tion occurs. The same principle applies to all wearing parts of car equipment. Bearings should be replaced more frequently than is the present practice. If any considerable reduction in noise is to be accomplished extreme wear must be prevented and definite limits of wear for the various wearing parts of car equipment should be established and should be enforced.

A special study of noises that come from car operation is being made by the equipment committee of the American Electric Railway Engineering Association. After the various causes for noises are classified and tabulated, it will probably be found that many of them can be relieved considerably by simple remedies. If, in addition to this, improved types of equipment be adopted and construction designed with the thought of reducing noise, much improvement will be accomplished.

\$12,000,000 Saving Vindicates Milwaukee Electrification

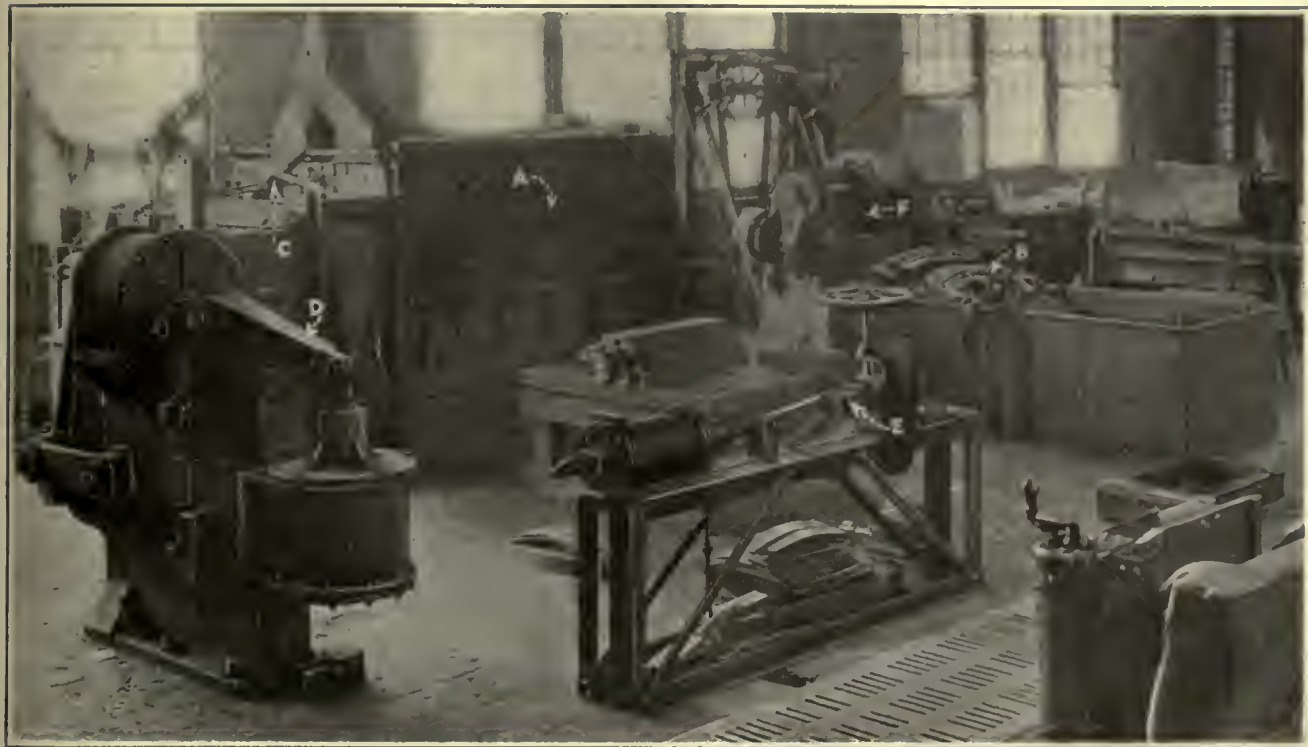
AT LAST figures are available to prove the wisdom of the directors of the Chicago, Milwaukee & St. Paul Railway in adopting electric motive power for 650 of the 880 track-miles between Harlowton, Mont., and Tacoma, Wash. They have been criticised for their judgment in this matter because traffic and other conditions on these long-drawn out stretches of single track seemed not as favorable for large savings as those which existed in other parts of the country. It is all the more encouraging, therefore, to the proponents of judicious electrification of steam railroads that the financial showing is so good. This good showing results from a number of causes, among which the following stand out prominently: Abundant water power, as compared with the scarcity of good coal; heavy grades, on which the motors of the electric locomotives act as generators and thus save energy and brakeshoes; greatly lessened maintenance cost of equipment and reduced yard expenses.

All of these advantages have been reduced to a cash basis, for which figures are presented in a statement just made public. An abstract is published on another page. While the figures may not prove the wisdom of the construction of the line itself and the expansion of the Milwaukee into a transcontinental line, they show that in the circumstances, even on items that can be measured in dollars and cents, the conversion of the line to electric power was justified. In addition, of course, electrification has made riding more enjoyable, a good merchandising point for passenger traffic, and greatly reduced the danger that the railway might cause forest fires, a very important argument, especially in the State of Washington, where there is a great deal of valuable standing timber.

These and other incidental advantages are not enumerated in the article already referred to, but even without them the saving effected by electricity during the 9 years since the first division was put in service amounts to more than \$12,000,000, after full allowance had been made for depreciation and interest charges on investment. As a whole, the figures are the most nearly complete of any made public giving the results from electrical operation on an electrically equipped steam railroad. May the example of the directors of the Chicago, Milwaukee & St. Paul Railway in giving out these detailed data encourage those of other electrified steam railroads to do likewise.

Maintaining Car Springs in Twin Cities

Proper Maintenance of Springs Is Considered to Be an Important Item in Improving the Riding Quality of Cars, Keeping Down Step Heights and Reducing Noise and General Wear and Tear on Equipment—Special Machine Equipment Results in Better Springs and Lower Cost



The Spring Department in the Twin City Shops Is Arranged to Reduce Handling

The leaves are first heated in the oil furnace, A, and after forming and quenching in the adjustable forming machine, B, they are tempered in the end of the furnace at C. Spring bands are made in the machine at D and are put on in the machine shown at E. In the background at F is the rolling machine for tapering the ends of the spring leaves.

THE maintenance of car springs is considered of so much importance by the Twin City Rapid Transit Company, Minneapolis, Minn., that special equipment and machines have been developed in the company's Snelling Avenue shops for the work. In this way the costs have been held down to a point which makes it possible to replace springs on cars at the first indication of weakness. This renders it unnecessary to keep in service springs that have sagged, as is done sometimes by the expedient of inserting wooden blocks to maintain clearance between the car body and the apparatus underneath. Provision of proper facilities for the economical repair of defective springs eliminates the necessity of economizing in this particular way and thereby results in steps being maintained at the correct height, while the noise and general wear and tear on the equipment resulting from imperfect springs are reduced.

ONE MAN HANDLES EACH OPERATION

Much of the machine equipment used for spring work in the Twin City shop has been developed to meet the specific requirements of an operating company's maintenance shop, and the methods in use enable comparatively small lots of springs to be put

through at reasonable cost. All of this equipment is located in one section of the forge shop and is arranged with a view toward efficient use of a minimum number of men. One of the features of this arrangement is that practically every step in the work is carried out as a one-man operation.

Spring steel is purchased in bars of the proper dimensions for making the leaves of elliptic springs. Physical and chemical specifications assure a high grade of material. The first step in the shop process is to shear this material to the correct length. The cut pieces are next taken to a power-driven rolling machine, shown in an accompanying illustration, where the ends are tapered. They are then trimmed to exact length.

After being trimmed the leaves are ready to be formed to the proper shape for the finished springs. They are heated to 1,550 deg. F. in an oil furnace, described later, and are formed and quenched automatically in a machine shown in an accompanying illustration. This combined forming and quenching machine, which was developed in the company's shop, is designed so that it can be adjusted to form any shape of spring used on the various cars in service. The die is made up of a series of slotted dogs, each of

which is held in place by bolts. To form a leaf of any given shape, it is only necessary to set the dogs against a standard template made for the purpose, which is shaped for that particular leaf. Then the various bolts are tightened and the die is ready for use.

A die of this type is mounted on each end of a tilting table, which is supported in the oil tank shown in the illustration. An air cylinder in the center has a piston at each end, so that manipulation of the air valve causes the movable part of the die to be pushed out, first on one end of the table and then on the other end. The whole apparatus is so balanced on a central pivot that the change in the distribution of weight, caused by change in the position of the piston and dies as one is pushed out and the other pulled back, causes the table to tilt first to one side and then to the other. Tilting of the table submerges the die with the hot spring leaf at one end and raises the one at the other end.

In practice, two different leaves are put through simultaneously, one man handling the entire operation, including the heating. The die at one end of the table is set to form one of the leaves of a spring and that at the other end is set to form another. The proper material for these two leaves is prepared and a number of each type are put in the oil furnace. The two dies are then used alternately to run through the two lots of spring leaves. The capacity of the machine is fixed only by the time required for the steel to cool in the oil. While this is taking place, after each leaf is immersed, the single operator has time to attend to



A Close-Up View of the Forming and Quenching Machine

This shows the adjustable dies for forming the leaves to proper shape. The tilting table carries a similar die at the opposite end, which is immersed in the oil; as the operating piston moves first to one side and then the other, the two dies are alternately dipped in the oil. Two different spring leaves are run through alternately by a single workman.

the pieces of material heating in the furnace. As the piston is moved out, first toward one end and then toward the other end of the table, the leaf in the end that is raised out of the oil is released. It is readily removed from the die and set on a dripping screen to drain, preparatory to the next operation.

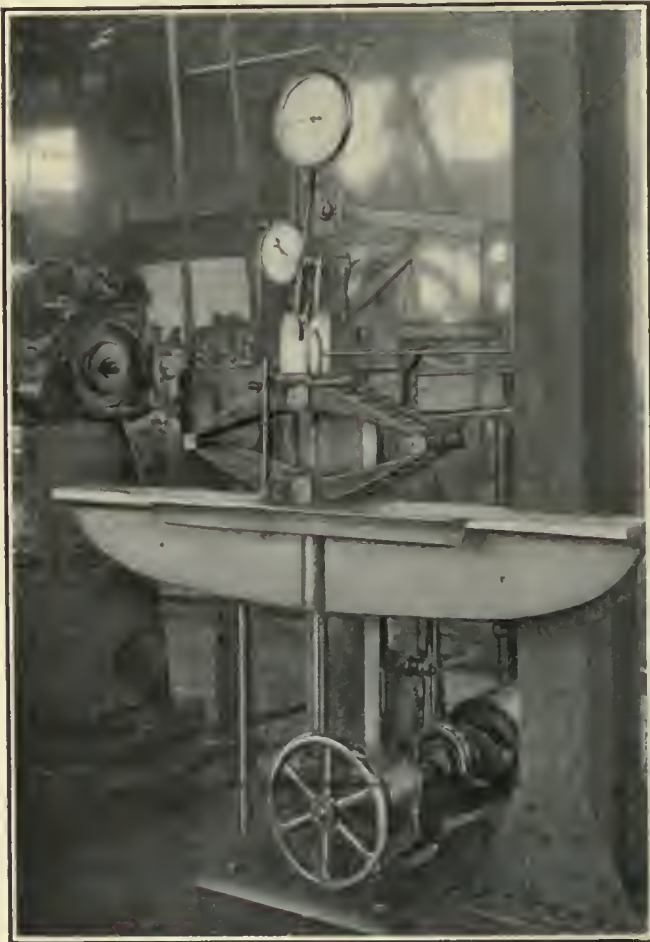
LEAVES HEATED AND TEMPERED IN ONE FURNACE

After forming, the leaves are ready for tempering. This is done in another compartment of the same furnace in which they are originally heated for forming. The furnace is shown in an accompanying illustration. It is rectangular in shape and is so arranged that the doors at the front open into a compartment which is heated to about 1,550 deg. F. for the forming and hardening operation. These doors are convenient to the forming machine just described. The general arrangement is shown in the illustration. In the end of the same furnace another pair of doors open into a tempering compartment, to which the heat from the one burner is deflected, the temperature being adjusted by means of a regulating damper. In this way a saving in fuel is made, as the one burner serves two heating operations at widely different temperatures.

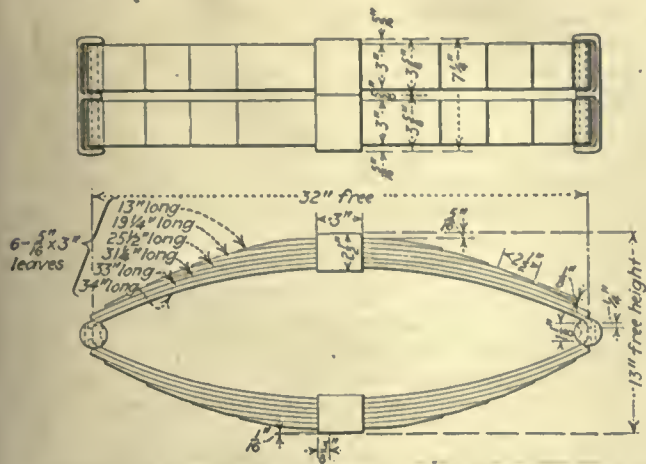
The tempering end of the furnace is divided into two sections, each fitted with individual doors. Thus the material in one compartment may be allowed to soak at the proper temperature while spring leaves are being withdrawn from the other. The tempering compartments are loaded in two layers, on gratings provided to increase the capacity. This furnace was furnished by the Mahr Manufacturing Company of Minneapolis and was specially designed to meet the requirements of this spring work. A suitable stack outlet for the tempering compartment draws off any gases that form and keeps them out of the shop.

When the formed spring leaves have been reheated to the proper temperature they are withdrawn by a workman who handles this end of the furnace and are individually fitted together while hot. They are then allowed to air cool.

Spring bands are forged in a commercial type of machine which is on the market for the purpose and



All Springs Are Tested to Uniform Specifications in This Standard Spring Testing Machine



**Complete Detailed Drawings for Each Type of Spring in Use Are
Furnished to Shop Foremen for Their Guidance**

WORKING LOADS			
Deflection	Loaded Height	Load in Lb.	Car Load
24 in.	104 in.	4,000	Empty
3 in.	10 in.	5,000	Seated
4 in.	9 in.	7,200	Standing

which is shown in one of the accompanying illustrations. These bands are then placed on the springs, in a special machine designed and built in the shop. This is also shown in an illustration. It is designed so that the spring leaves are held together in a clamp mounted near one end of a light structural frame which forms the bed of the machine. At the other end is an air cylinder carrying a clevis that slides in a slot between two horizontal angle members. A pivoted shoe on the clevis is arranged to force the band into place over the spring leaves when air is admitted to the cylinder.

In practice, new material is added to elliptic springs only as required. Any of the old leaves that are not too badly corroded are retempered and used again. Thus the amount of new steel required is held to a minimum consistent with putting the springs in proper condition for service.

TESTING THE SPRINGS

All guesswork has been eliminated in this work by the installation of a modern spring testing machine. From the standpoint of securing satisfactory and uniform results, this testing work is considered second in importance only to the tempering of the material. It is considered to be impossible to determine just what results are being accomplished unless proper facilities for testing are available.

Shop foremen are furnished with detailed drawings showing the exact dimensions of each type of spring in use. In addition, specific test data showing the working loads and allowable deflections for the different springs on various cars have been worked up and are furnished in convenient data sheet form to those in charge of the repair and testing of springs.

All springs going through the shop are tested for deflection under working load. A loaded height of $\frac{3}{8}$ in. more than that specified is permitted, but a variation below the specified height is not allowed. Free height is determined after the maximum working load has been once applied and fully released. After this the permanent set is determined by again applying maximum working load and then completely

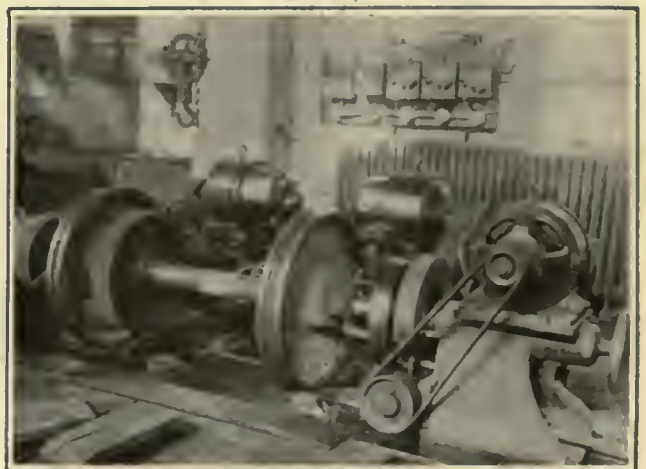
releasing the spring a second time. The difference between the height after this second load is released and the original free height indicates the permanent set. This is not allowed to exceed $\frac{1}{16}$ in. If, however, there is any permanent set (not exceeding $\frac{1}{16}$ in.) the spring is again fully loaded and released twice, and must thereupon show no increase in the amount of permanent set.

Wheel Maintenance Practice in Denver

Pit Grinders Used for Truing Up Rolled Steel Wheels When Any Evidence of Wear Develops—Auto- matic Welder Builds Up Sharp Flanges

THE Denver Tramway has had considerable success in the use of automatic welding and grinding equipment in the maintenance of rolled steel wheels. The objective has been to minimize the amount of turning required so that as much as possible of the available metal of tread and flange will be actually useful in service, with resulting increased mileage for these wheels.

When this property adopted rolled steel wheels, the carhouses were equipped with pit-type wheel grinders installed for the maintenance of cast-iron wheels. Very favorable results have been obtained from these same grinders in maintaining rolled steel wheels. The practice is to true up wheels showing any evidence of worn flanges by running the car over the grinder and taking care of the situation before the wheels reach such a condition that they must be brought into the shop for turning. As a result, comparatively few wheels are turned, and this usually occurs only when it is necessary to match sizes of second-hand wheels for mounting them on a new axle. Besides the increased wheel mileage obtained by a reduction in the amount of turning, there is a substantial labor saving as a result of not



When It Becomes Necessary to Send Wheels to the Shop, the Flanges and Treads Are Trued Up on the Grinder

having to take the wheels out from under the cars several times during their life.

Most of the carhouse grinding work is done when the cars are in the house during the non-rush hours. The average time per pair of wheels is about three-quarters of an hour. This figure is taken from the average for a month on four divisions, and includes the time of shifting cars, jacking and preparation for grinding, as

well as the actual time involved in truing up the wheel. The object of the pit grinding being to catch the wheel as soon as it shows any evidence of wearing a sharp flange and to true up the flange and tread before the condition becomes so serious as to require the wheel to be taken out, the wheels are largely worn out in service and the average mileage obtained has been materially increased. At the present time, the average mileage for 31-in. nominal diameter wheels with 3-in. treads is approximately 125,000 miles per wheel.

The practice of grinding wheels at the carhouses has reduced considerably the amount of work done at the shop. At present one man in the shop, working only part time, performs all the wheel work which is done, and which formerly required two men working long

out of the machine. This is closed by a large canvas curtain mounted on an overhead roller so that it may be raised and lowered readily. The general arrangement is shown in an accompanying illustration.

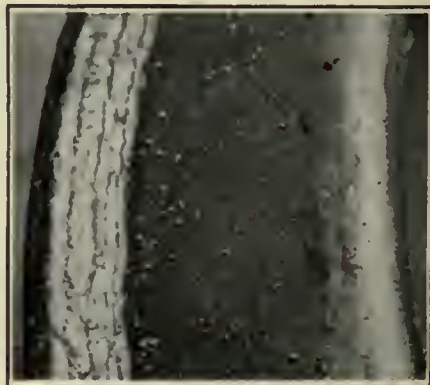
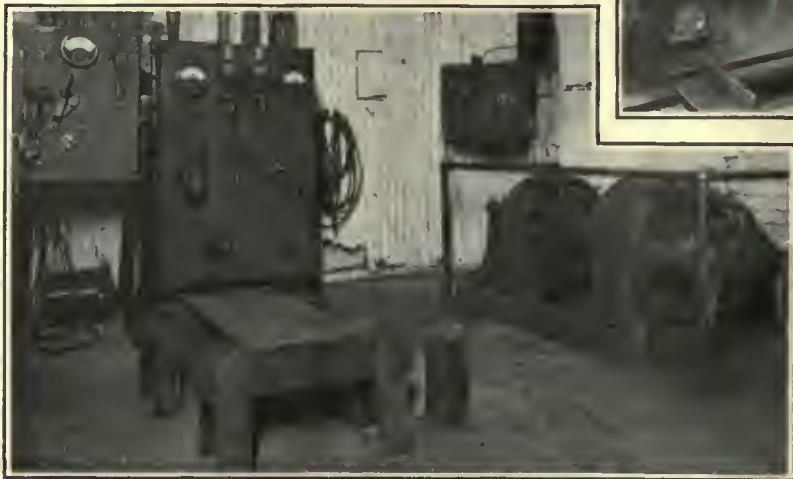
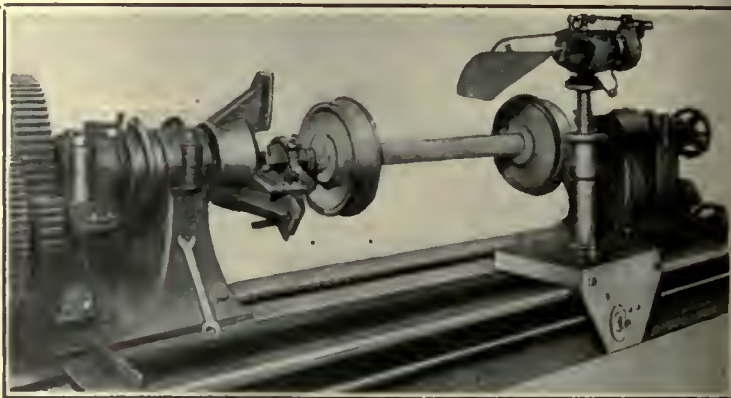
WELDING TIME VARIES WITH CONDITION OF WHEEL

The time of welding varies with the condition of the wheel. Usually it has been found necessary to weld only one flange of a pair of wheels. An average thin flange on a 31-in. wheel is welded with the single head machine in about 2½ hours. The welding material is laid on with a current of about 225 amp. and with the wheel rotating at a peripheral speed of about 7 in. per minute. The wheels are cleaned in advance with a steel brush. No material is turned off the wheel and the welding mate-

At Right, the Single Head Wheel-Welding Machine

This is made up from an old lathe bed with the automatic welding head mounted on an adjustable carrier. A canvas curtain mounted on an overhead roller covers the openings in the partition back of the welder, which permits wheels to be moved readily in and out of the machine.

Below, Miscellaneous Hand-Welding Work Is Done in the Welding Room, in Which the Automatic Machine Is Located



Condition of a Welded Flange Before Grinding

hours in shifts. No wheel-turning lathe is considered necessary, and what little wheel turning is required is done on a large engine lathe that has been fitted up for this purpose.

A small proportion of the wheels develop sharp flanges when allowed to go too long without grinding at the carhouses. When this occurs these wheels are brought into the shop for welding and grinding. A General Electric automatic welding outfit, with single head, is used. The welding equipment and control panels were purchased from the manufacturer and the driving lathe was built in the company's shop. The lathe is equipped with individual motor drive and external gear speed control gears so as to rotate the wheels at proper speed for welding. The welding head is carried on a specially designed carriage which may be moved laterally on the bed of the machine and also has a screw adjustment for setting the head at the correct height.

This welding work is done in a compartment partitioned off from the remainder of the shop with corrugated sheet steel. An opening in the partition back of the welder allows the wheels to be moved readily in and

rial is applied with the flange just as it comes in to the shop. No difficulty from chipping of flanges has been experienced after welding. Before the installation of this outfit the welding was done by hand. In that case some difficulty from chipping occurred. No attempt is made to weld the tread.

After welding, the wheels are set up in the shop grinder shown in an accompanying illustration. This is a number 0 machine made by the Springfield Manufacturing Company, Bridgeport, Conn., and has been found entirely satisfactory for this work. The time of grinding varies with the condition of the flange and tread. Usually, only one flange of a pair of wheels is welded, and then both flanges are ground and the tread trued up if necessary. The time of grinding in the shop varies from one-half hour to one hour per pair of wheels, and the work is done by one man, working only part time. An accompanying illustration shows the condition of a welded flange just after metal is applied and before grinding.

Specialized Inspection Reduces Pull-Ins on Kansas City Railways

Designation of Certain Trained Men to Do Inspection Work Exclusively Has Resulted in Eliminating Many Street Failures—Cars Are Inspected Both Before and After the Work Is Done and Each Man Is Held Responsible for the Group of Cars Assigned to Him—Graphic Records Help to Check Performance

ADoption of what might be called specialized inspection methods by the Kansas City Railways has had a material effect in producing a simultaneous reduction in both maintenance costs and pull-ins chargeable to mechanical defects. This specialized inspection consists in so subdividing and standardizing the work that it can be carried out by specially trained men who have become highly expert inspectors and go over each car in accordance with carefully planned routine methods. This practice, together with that of working toward standard maintenance methods in the various carhouses and in the shops, the use of high-grade materials and a spirit of frank co-operation between the shop and the inspection carhouses have all contributed materially toward the favorable results accomplished.

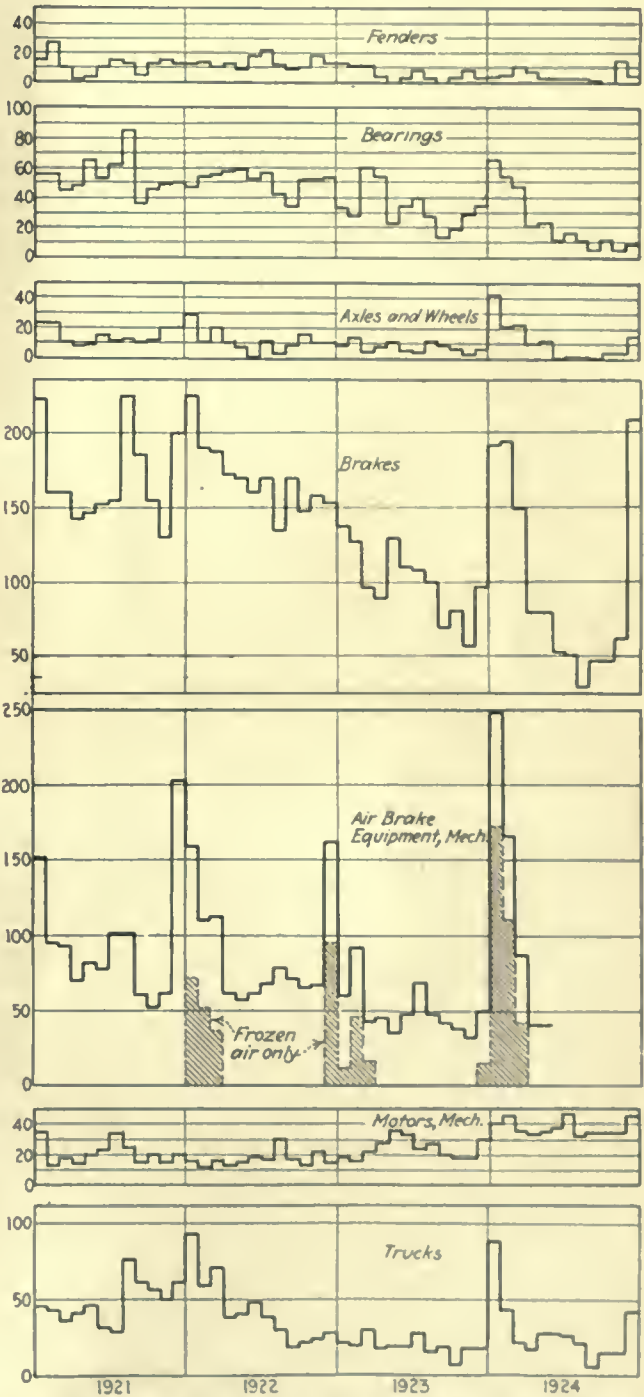
FOREMEN HAVE REGULAR MEETINGS

Foremen's meetings held on a regular schedule, in which a spirit of democracy is carefully cultivated, are considered to be no small part of the general scheme. Care is taken to avoid giving them the atmosphere of a series of lectures from the superintendent of the department. The men are encouraged to take part actively in frank discussion of any maintenance or operating difficulty that develops in the various carhouses and a particular effort is made to encourage the discussion of methods of improving the practices of the department.

Along with these meetings, a general open-door policy is maintained in the superintendent's office. Each foreman is encouraged to take a general interest in department activities. New policies and practices are freely discussed both in individual conferences and in the foremen's meetings. Full records of maintenance costs are made available to the foremen so that each may not only check up his own performance in comparison with the other men but may also be familiar with the results accomplished by the department as a whole. New ideas are checked up in advance by being discussed in the foremen's meetings. In this way the benefit of the experience of the men in actual contact with the maintenance work is obtained. If the new method is to be adopted, the co-operation of all the men is assured by making them entirely familiar with all of the factors connected with the adoption of the change in practice and the procedure to be followed.

COMPLETE MOTORS CHANGED AT CARHOUSES

At one time cars were brought to the shop for making wheel and armature changes. Subsequently it was found that this work could be carried out more economically by changing the wheels at the carhouses and by making replacements of complete motors when any



Defects Found on Air Brake Apparatus and Motors Are Divided Into Both Electrical and Mechanical Groups. Some of the Other Principal Subdivisions of Mechanical Defects Are Shown by These Curves. Unusually Severe Weather Encountered in January, 1924, Is Reflected in the Sudden Rise for that Month

parts such as armatures, fields, bearings or pinions required repair or replacement. It was decided that the practice of changing armatures at the carhouses does not properly safeguard the condition of the fields and the fit of the end housing in the frame. It also creates a hazard through rough handling of armatures or bearings when they are shipped back and forth between carhouse and armature room.

It was found perfectly feasible and economical to ship the complete motors back and forth between shop and carhouses. Thus all motor work is concentrated in

a group of specialists in the shop. A proper condition of fields is assured each time an armature is changed. Then, too, the practice gives a shop check of the axle bearing wear, and in a number of other ways helps to maintain the motor in the best possible condition. As each motor is brought into the shop the leads, fields and brush holders are inspected by shop experts. The fit of the end housing in the motor frame is carefully checked from time to time. Another result which has accompanied the practice of bringing all motors into the shop has been the elimination of shims of one kind and another, toward the use of which there is always a tendency when part of the motor maintenance is carried out in the carhouses, where insufficient tool equipment is available to enable worn surfaces to be properly built up and remachined.

LESS WORK BY CHANGING COMPLETE MOTORS

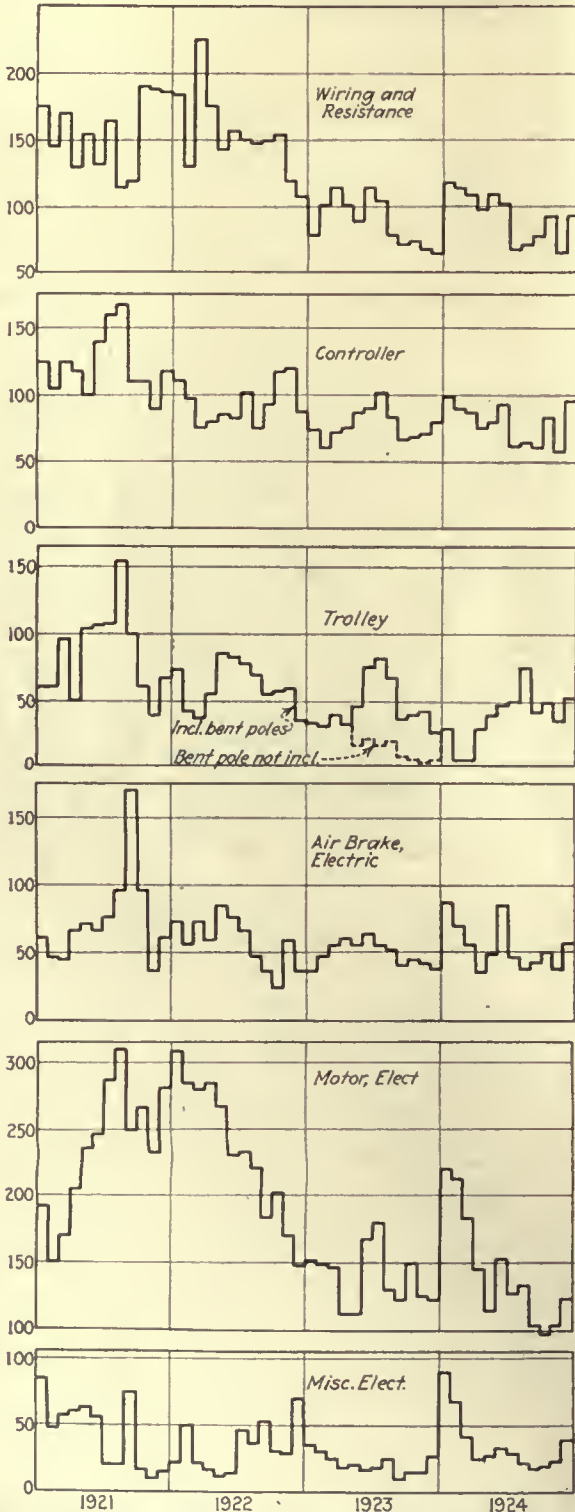
After the adoption of the practice of sending complete motors to the shop, it was found that there is really less carhouse work involved in changing complete motors than in removing and replacing armatures, pinions and bearings at the carhouses. When the change in procedure was made the general overhaul period for cars was reduced to 50,000 miles in order to put the cars into the best possible condition by eliminating considerable deferred maintenance. As the cars were put in better condition the general overhaul period was gradually extended until it is now on an 80,000-mile basis. At these general overhauls the trucks as well as the car bodies are also completely gone over and put in first-class condition.

An important part of the general scheme for reducing pull-ins is the carefully worked out system of records which are compiled graphically in such form as to enable an analysis of the causes of pull-ins to be made. These records enable the head of the department to make comparisons of the results obtained by various divisions, and also of the troubles experienced with different types and classes of equipment. Examples of the method of subdividing pull-ins are shown in the accompanying illustrations.

A careful check is made through both the transportation and mechanical departments to make sure that car defects are properly reported. These reports are the basis for the pull-in records. In each operating carhouse is a division log book in which each trainman going off duty is expected to record any defects that come to his attention while operating the car for which he signs off. The trainmen also report these defects to the carhouse hostler or car shifter when the cars are brought in from service. The hostler makes out a ticket report in duplicate, one copy of which goes to the carhouse repair foreman and the other to the transportation department division superintendent.

TRANSPORTATION DEPARTMENT REPORTS FAILURES

Transportation irregularities from any cause, including equipment failures, are reported over the transportation dispatching system telephones. These are summarized each day by the chief dispatcher in a daily transportation department statement. Each carhouse repair foreman also compiles a daily pull-in report from the hostler's tickets, indicating the cause reported for the pull-in and the exact condition found by the inspectors. The carhouse foremen also indicate on their reports the classification under which each pull-in should be grouped.



Graphic Records Facilitate Analysis of Causes of Car Failures. Class A Pull-Ins Include Only Those for Which Mechanical Department Is Responsible. Subdivision of Electrical Defects Is Shown in the Above Curves

Car No. _____

KANSAS CITY RAILWAYS COMPANY

CAR RECORD CARD

Type _____ Weight _____ Type Motors _____ H. P. Motors _____ Trucks _____ Date Purch. _____

No. 1			No. 2			No. 3			No. 4		
DATES		Armature	Pinion	DATES		Armature	Pinion	DATES		Armature	Pinion
In	Out	Serial No.	Serial No.	In	Out	Serial No.	Serial No.	In	Out	Serial No.	Serial No.

DATES		COMPRESSOR	DATES		AIR MOTOR ARM	DATES		SHOP REPAIRS			
In	Out	Type	Serial No.	In	Out	Type	Serial No.	In	Out	DESCRIPTION OF WORK DONE	

Car No. _____

DATES		AXLE	GEAR	WHEEL	WHEEL	DATES		AXLE	GEAR	WHEEL	WHEEL	CLASS "A" PULL IN RECORD	
In	Out	No. 1	No. 1	No. 1R	No. 1L	In	Out	No. 2	No. 2	No. 1R	No. 1L	DATE	NATURE OF FAILURE

DATES		AXLE	GEAR	WHEEL	WHEEL	DATES		AXLE	GEAR	WHEEL	WHEEL
In	Out	No. 2	No. 2	No. 2R	No. 2L	In	Out	No. 4	No. 4	No. 4R	No. 4L

MISCELLANEOUS DATA			
ITEM	REMARKS	ITEM	REMARKS
Controller		Motorman's Cab	
Circuit Breaker		Motorman's Railing	
Trolley Stand		Folding Steps	
Fender		Folding Doors	
Head Light		Sliding Doors	
Dist. Signs		Safety Air Valve	
Motorman's Valve		Brake Cylinder	
Air Governor		Braking Ratio	
Slack Adjuster			
Door Signals			
Door Engine			
Dis. Drawbar—Front			
Dis. Drawbar—Rear			

Above—Front Side of Car Record Card Shows Complete History of the Main Items of Equipment on Each Car.
At Bottom—Back of Record Card Provides Space for Log Record of Pull-ins and Shows Up Recurring Defects on Individual Cars

Copies of both the carhouse repair foreman's report and the transportation dispatcher's report are forwarded daily to the mechanical department office, where any discrepancies that may have occurred can be checked by a comparison.

As these pull-in records are received from day to day, the mechanical department office makes up a daily summary, classifying them into three main groups. The first, comprising what are known as Class A pull-ins, includes those attributable directly to failure of some part of the apparatus or equipment on the car. The second group, known as Class B pull-ins, includes cars pulled in for the same causes as those in Class A, but which are found O.K. when inspected. Cars pulled in for any other causes, in which the mechanical department is not directly responsible, such as damage from collisions, derailments, etc., are grouped into Class C. Any car which is taken out of service, because of defects of any kind, before completing its regularly scheduled service is classed in one or the other groups of pull-ins.

Each carhouse repair foreman carefully analyzes each case of pull-in and posts a record on the carhouse bulletin board indicating not only the results found by the inspection but also the man who was responsible for work on the defective car.

Most of the inspection work is done during the day. The inspectors report the conditions found, but do not actually make repairs themselves. This practice is followed in order to make the men more critical than would be the case if they made the repairs themselves. As a result of this specialization of the inspection work, the number of men required properly to supervise the condition of the cars has been reduced approximately 10 per cent. Each man thoroughly inspects approximately seven cars per day.

Two general inspectors report to the supervisor of the division mechanical forces in addition to the in-

dividual carhouse foremen. These general inspectors have direct supervision of the inspectors in the various carhouses. This arrangement gives the individual foremen full charge of the labor forces in the carhouses, as well as the work which is carried on, but the inspectors do not report to these foremen for orders. The inspection forces are kept separate from the maintenance forces, but the work of both is co-ordinated through the supervisor of the division mechanical forces.

CARD RECORDS MADE FROM PULL-IN SUMMARY

A copy of the summary of pull-ins, made up in the equipment department office, goes to each chief inspector. He checks over the cases which involve equipment in his charge, and thereby supervises the work of the

Form 613-14-100

DIVISION CAR INSPECTION

Car No. _____ Date _____ Division _____ Inspector _____

Trucks

Frame _____ Side and Center Bearings _____

Wheels _____ Axles _____

Brakeheads _____ Shoes _____

Journals _____ Splitcollars _____

Brake Rigging _____

Turnbuckles or Slack Adjusters _____

Hand Brakes _____

Motors

Armature Clearance _____

Commutators and Bindingbands _____

Bearings _____ Pinions _____

Brushes _____ Gear Cases _____

Gears _____ Brush Holders _____

Air Equipment

Compressor _____ Brake Cylinder _____

Motorman's Valve _____ Governor _____

Safety Valve _____ Door Engines _____

Piping _____ Reservoirs _____

Car Wiring

Motor Leads _____ Compressor Wiring _____

Heaters _____ Lighting _____ Switches _____

Battery _____ Relay _____ Buzzer _____

Controller _____ Automatic _____ Fuse Box _____

Resistance _____ Lightning Arrestor _____

Trolley _____

Car Body

Register _____ Glass _____ Seats _____

Floors _____ Curtains _____ Signs _____

Fender _____ Paint _____ Roofs _____

Grab Handles _____ Stanchions _____

Doors _____

Steps _____

Remarks _____

All Items Marked O. K. Have Been Repaired. Foreman _____

Date _____

Inspection Form Must Be Signed by Repair Foreman Before Car Is Released for Service. Each Car Is Inspected Both Before and After Repair

individual inspectors. Another copy of this report goes to the record room of the mechanical department for tabulation on the individual car card record, shown in an accompanying illustration. The records thus indicate any recurring defects on individual cars and give a ready check of the performance of individual inspectors assigned to those cars. Outstanding cases of repeated trouble, either on individual cars or on certain classes of equipment, are handled by memoranda sent out from the office to the carhouses, or are taken up for discussion in the carhouse foremen's meetings.

Steel Vestibule Window Posts Allow Broader Outlook

IN THE design of the latest light-weight one-man, two-man surface cars bought by the Boston Elevated Railway an innovation suggested by the legal department of the company has been incorporated. In order to give the least possible interference to the outlook of the motorman the vestibule window posts are narrow sections of pressed steel. All vestibule window sash is of metal, so that between the belt rail and the roof



Narrow Window Posts and Metal Sash Have Increased the Vestibule Window Area on This Car

the end of the car is nearly all glass. This modification is expected to reduce materially the number of accidents. The appearance of the end of the car is shown in the accompanying illustration. In other respects these cars are the same as the light-weight one-man, two-man cars which have been in service on the Boston Elevated for several years past.

Emergency Equipment in Street Boxes

WRECKING and emergency equipment for use in the event of a car derailment or minor accident is provided by the City Railway in a number of substantial locked boxes located at various points in the business district of Dayton, Ohio. This equipment includes rerailling shoes, a heavy chain and a heavy-duty jack. A similar practice in New Bedford was described in this paper Jan. 17.

The boxes are kept locked to prevent tampering or theft but in addition to providing keys for authorized railway employees, keys to these boxes are also furnished to traffic officers on duty near the points where the emergency boxes are located. Consequently in the event of a disabled wagon, derailment or other accident that would cause delay in car schedules, emergency equipment is made available at the earliest possible moment, and bad delays are frequently avoided.

Old Rail Used for Ties in Bangor

Rigid Reinforced Concrete Track and Paving Construction Is Employed—Wood Ties Are Alternated with Steel Ties, Which Are Welded to the Base of the Running Rail—Joints Are Thermit Welded

By E. W. Jennison

Engineer Maintenance of Way Bangor Railway & Electric Company

A TYPE of track construction in which old 60-lb. T-rail was used for ties has been quite extensively employed by the Bangor Railway and Electric Company. Placement of concrete in a single course between the ties and up to the head of the rail produced a rigidly reinforced structure.

REMOVAL OF OLD TRACK

The old structure consisted of light T-rail, ranging in weight from 58 to 70 lb. per yard, laid on cedar or hemlock ties, spaced 20 in. center to center. Little or no ballast was used under the ties. The space between the ties and up to the top of the rails was filled with bank-run gravel or crushed-stone macadam without any binding material on the wearing surface. The rail was fastened to the ties with $5\frac{1}{2}$ -in. x $\frac{7}{8}$ -in. drive spikes and the joints were of the four-bolt Weber type.

No traffic was maintained on the track under construction, even while the excavating was going on. In the case of double track, traffic was routed to the second track with Lorain Steel Company's portable crossovers built of 60-lb. stringer type of rail. In the case of single track, provided the rail itself was not to be changed, a temporary track was built alongside. If new rail was to be installed the old

track was pulled to one side by a 5-ton Holt tractor and used as a temporary track.

A Russell special scarifier drawn by the 5-ton Holt tractor was first run over the track two or three times, with the teeth of the scarifier set low enough just to clear the tie tops. When a rail was straddled one tooth was removed from the scarifier. This loosened all material above the ties. Next, pockets were dug under the rails and the track jacked up, after which it was either pulled one side for temporary track or taken apart. This left the ground clear for completing the excavation under the most favorable conditions, which was done by loosening the material with a construction plow, tractor drawn, after which it was shoveled by hand onto flat cars and distributed on the shoulders of suburban lines. Excavating was to a depth of 15 in. below grade.

In nearly all cases there was no preparation of the subgrade except to level it off, the track slab resting on the natural soil, except that bank-run gravel to the depth of 4 in. was placed under the ties for use in tamping. Where seepage conditions appeared in the subgrade, trenches were dug below the frost line. The trenches were filled with rocks and tile pipe was then installed to drain to the sewer. The sub-



Joints Welded and Track Ready for Concrete



Track Slab Finished—Note Temporary Track

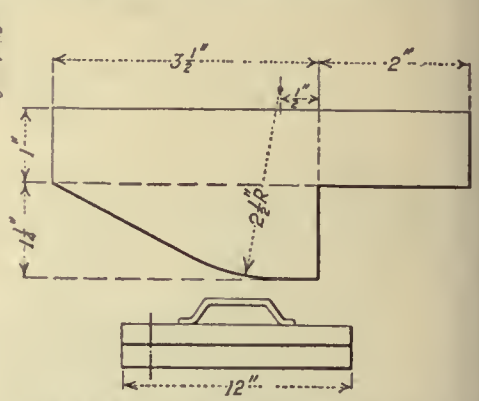
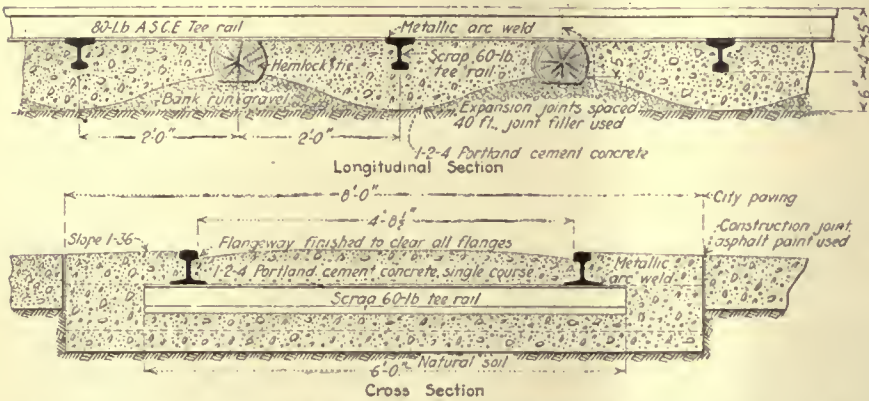


Appearance of Finished Concrete Pavement

grade was not rolled, as the natural soil was already very thoroughly compacted.

Native hewn hemlock ties were laid out on the subgrade on 4-ft. centers. Between these were placed 6-ft. lengths of 60-lb. scrap T-rail to serve as cross-reinforcing members for the paving, the running rails serv-

ing as longitudinal reinforcing. The running rails were next laid and fastened with 5½-in.x½-in. drive spikes to the ties. Joints were made up temporarily with angle splice bars, using only one bolt. At this time the steel inserts used in thermit welding were placed between rail heads. Then the track was surfaced in the usual manner by hand tamping with shovels, using the gravel placed under the ties, and lined, after which thermit welds were made.



Longitudinal View and Cross-Section of Track Construction Using Old Rail for Ties Flangeway Template for Concrete Paving

ing as longitudinal reinforcing. The running rails were next laid and fastened with 5½-in.x½-in. drive spikes to the ties. Joints were made up temporarily with angle splice bars, using only one bolt. At this time the steel inserts used in thermit welding were placed between rail heads. Then the track was surfaced in the usual manner by hand tamping with shovels, using the gravel placed under the ties, and lined, after which thermit welds were made.

Cross-reinforcing members were lifted into place under the rail by means of small tongs and a chain on one end of a long lever. One man held the member in place while the welder spot welded it to the rail. The entire stretch of track under construction was covered in this manner and later the welder returned alone and finished the welding. This was done by the metallic arc process, using a Rail Welding & Bonding Company type B B dynamotor with ¾-in. grade 30 steel rod. It required ¼ lb. of steel rod per cross-reinforcing member. These cross-members take care of cross-bonding in a very thorough manner. After welding and just previous to pouring the paving the track was given a final surfacing and lining.

this happens the finished surface of the paving is damaged and rapid disintegration caused by vehicular traffic will take place in the flangeway. After its initial set calcium chloride was spread on the pavement surface to hasten the final set of the concrete. After 10 days the track was opened to electric car traffic.

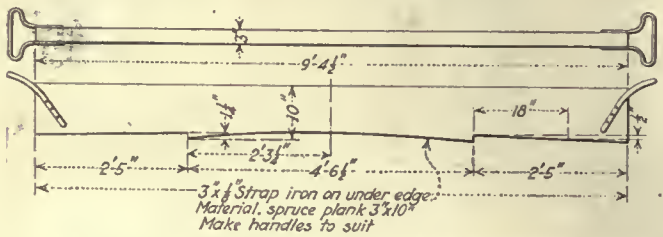
WELDS GROUND WITHOUT LIFTING WHEEL

Grinding the welds is one of the most important steps in track construction where the thermit process is used, because if it is not properly done a cup may develop. The joints when welded were given a slight crown. When the paving had been poured 2 days the grinding of the welds was started. The running surface was ground with a Universal rotary track grinder and the gage side with a type M-8 flexible shaft grinder, both made by the Railway Track Work Company. The guides of the Universal were not warped. This, together with the joint crowning, allowed a perfectly flat cut, running off to nothing, to be made without lifting the grinding wheel. Particular care was taken on the first cut to hit only the high spot at the insert and at no time to force the grinding in the least. It was found that forced grinding left a high spot on the finished surface at the insert, which in a very few months showed bright and later caused a slight cup beyond.

A little more than 2,000 ft. of single track area 8 ft. wide, as shown in the accompanying drawing, was constructed during the 1924 season, in three separate locations, at a total net cost of from \$5.97 to \$6.68 per foot of single track. In the case of the low figure the rail was not renewed, the battered ends being cut off with an oxyacetylene torch. It is interesting to note that in this case the thermit welds consumed 12 per cent of the total net cost, whereas in the case of new rail the percentage was 6 and 7. The cost of the thermit welds was \$9.95 each with old rail as against \$6.70 with new rail. The largest of these three jobs contained only 51 welds, and it is reasonable to suppose that on larger jobs the cost per joint could be lowered. The paving cost ranged from \$2.18 to \$2.83 per square yard, which is approximately equivalent to a figure of \$7 to \$9 per cubic yard. Total labor charges were from \$1.64 to \$2.21 per foot of single track. Common labor was obtained at a cost of \$3.50 per 9-hour day.

CONCRETE IS POURED IN A SINGLE COURSE AND HAND TAMPED

Actual paving was done by a city crew and mixer, although the railway paid the cost. This consisted of actual labor and material charges plus a rental of \$20 a day for the mixer. Concrete was mixed 1-2-4 and was



Concrete Tamper Used by Bangor Railway & Electric Company

laid in a single course. Particular care was taken to have the mix dry enough and to have it thoroughly tamped under the rails and cross-members. Tamping under the rail was done by hand, using ordinary rail-

Jigs Expedite Multiple Drilling

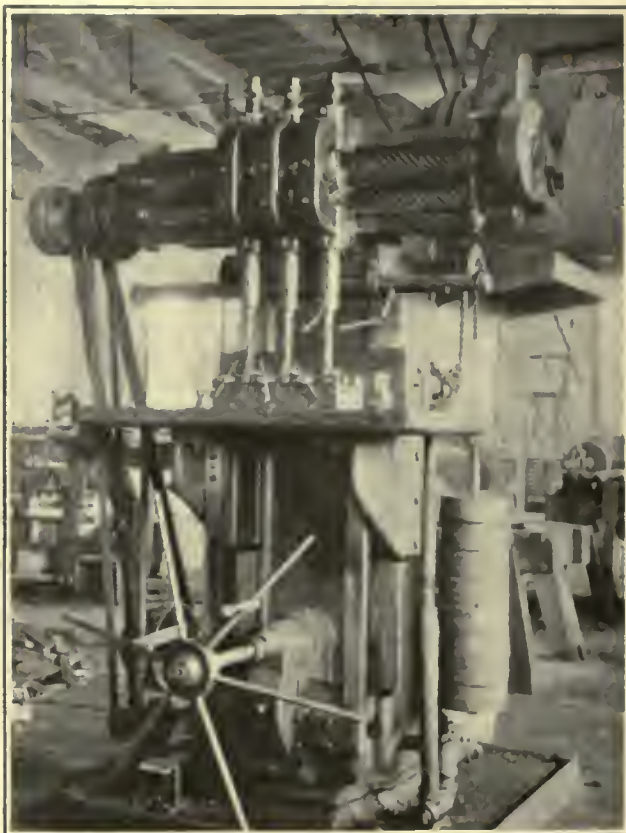
Variety of Operations Performed on Three-Spindle Drill in Columbus Railway Shop by Use of Proper Jigs

HOLES in brake levers, adjusting nuts and other similar parts are drilled three at a time in the repair shop of the Columbus Railway, Power & Light Company. The machine used, a Moline "Hole Hog," has proved particularly useful due to the jigs that have been designed and made in the shop for it.

The machine has three spindles mounted on a stationary crosshead. The table may be raised or lowered approximately 30 in. by hand or by power to feed the work to the drills. The spindle heads may be moved laterally the width of the table, which is approximately 30 in. Due to the width of the spindle head, the minimum center-to-center distance between adjacent drills is 5 in. The machine has a separate motor drive and a capacity of three 1½-in. drills in 0.050 carbon steel.

The three holes in brake cylinder levers and in truck brake levers are drilled at one operation. As used on this property, air-brake cylinder live levers are approximately 18 in. long and are made of 1-in. x 3½-in. steel. Two end holes in these levers are 1½ in. diameter, while the center hole is 1¼ in. diameter. The jig made for use on this job has a base of 1-in. x 3½-in. steel, mounted on three legs, one at each end and the third at the center of the base. The jig guide plate is mounted approximately 1 in. above the base, this being sufficient to allow the insertion of a brake cylinder lever blank. Two stops at the back and a pair of clamps at the front hold the lever in the proper position. These front clamps swing down out of position to allow the blank to be inserted and removed.

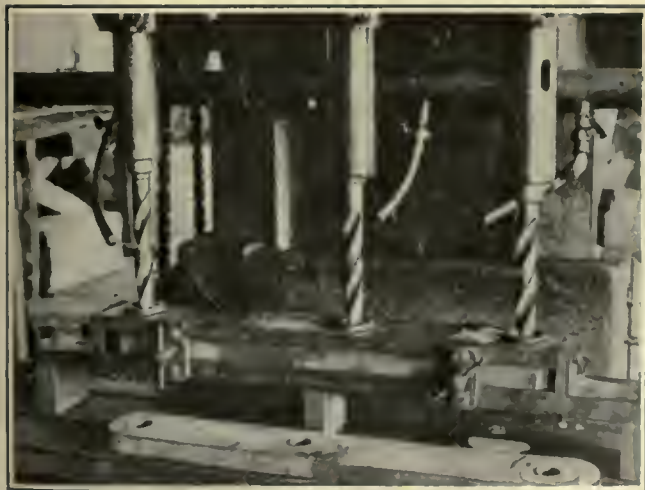
A different type of jig is used when drilling the three holes in a brake lever for a Brill No. 22 truck, in which two of the holes are located less than 5 in. apart. Consequently, it was necessary to make a special jig for drilling simultaneously two holes in one lever and the third in another lever, in order to work the machine at full capacity. This resulted in a jig of right-angle construction. The main portion, containing the bushed guides for two holes in the lever, is identical in construction with the jig used for drilling the air brake cylinder lever. However, at one end is a right-angle extension, which holds a second lever



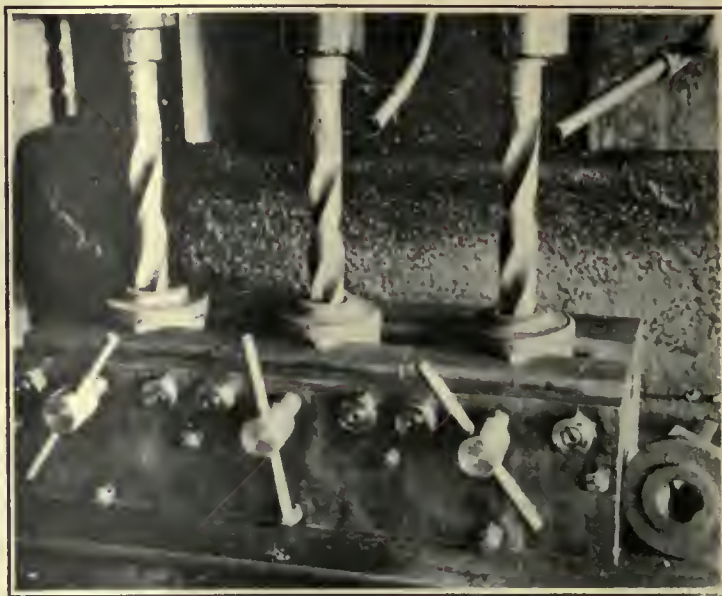
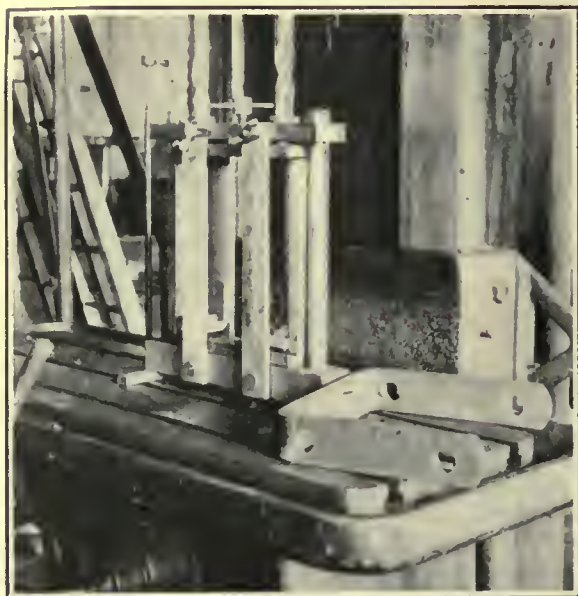
Various Drilling Operations Are Performed on This Moline "Hole Hog," for Which Numerous Jigs and Fixtures Have Been Made. It Is a Three-Spindle Drilling Machine with Individual Motor Drive

in a box-like holder. Two removable pins fit into the two holes drilled in the blank in the first position, thereby aligning it for the third hole. Thus after two holes have been drilled in the first blank of a given lot, it is possible to drill three holes at a time, one being drilled in the first lever while two holes are being drilled in another piece.

This jig is made up of a 1-in. steel base supported on four legs. The top guide plate, stops and clamps are similar in design and construction to those on the jig for air-brake cylinder levers. The main part of the jig is provided with an adjusting set screw for aligning the blank for the first two holes. This is shown in an



At Left, Simple Jig Holds Air Brake Cylinder Lever While Three Holes Are Drilled Simultaneously. At Right, Where the Holes Are Closer than the Minimum Spacing of Spindle Centers an Angle Jig Allows the Full Machine Capacity to Be Used by Drilling Two Holes in One Lever While the Third Is Being Drilled in Another



At Left, Two Holes Are Drilled in Each Side of Ash Grate Links While They Are Held in This Jig. At Right, Brake Rod Adjusting Nuts Are Drilled Three at a Time in This Simple Fixture

accompanying illustration, which gives an idea of the jig and also of the finished product.

Another handy jig used in conjunction with the same machine is one for drilling grate links for the power house of the company. Although not a railway maintenance or replacement part, reference is made to it because this jig increased the scope of work that can be done with the drilling machine. The base of the jig is of such dimensions as to accommodate one side of the drag link. The top is similar and is mounted so as to allow room for the U-shaped link. On the back of the jig two uprights permanently fastened to the top and bottom members serve as stops for the blank. In front, two similar uprights are fastened so they can be swung out of the way when a link is inserted. Hardened bushings guide the drills which pass through the top member of the jig and also through two angle brackets fastened to the rear supports just above the lower leg of the link. Two long $\frac{1}{2}$ -in. drills are used to drill the two holes through both the upper and lower sides of the link.

In addition to such jigs as those described, a variety of fixtures are also used in conjunction with the Moline

machine. One of these, which may be taken as representative, is a fixture clamp which holds three brake-rod adjusting nuts for simultaneous drilling. This fixture has its bottom and sides made of 1-in. steel. The back and front of the fixture are held together by $\frac{1}{2}$ in. bolts, which serve as guides for the clamp portions of the fixture, which are moved back and forth by means of small hand screws in the front plate. The clamp jaws are cut out to engage the square shanks of the adjusting nuts. Three $\frac{1}{2}$ -in. drills are used simultaneously with this particular fixture and the time of drilling the nuts is about one-half what it was when each nut was drilled separately.

Oxyacetylene Torch Used to Good Advantage in Omaha

IN THE shops of the Omaha & Council Bluffs Street Railway T. E. Wood, master mechanic, has found that careful study of the various types of repair jobs to which the oxyacetylene torch can be applied yields rich returns in reduced maintenance and repair costs.

An example of the large savings that can be made



An Oxyacetylene Torch, in the Hands of a Skilled Operator, Made Possible a Substantial Saving in Cost of Repairing This Damage
At left, the car as it came in after an accident. At right, use of the welder eliminated the necessity of removing the damaged side plate

through the use of the torch in the hands of a properly skilled workman is brought out in the accompanying illustrations. In this case a glancing blow received by a car from a vehicle on the street cut a deep gash in the side girder sheet, tore a piece out of the steel corner post and also damaged the side posts.

Ordinarily, this damage would have called for a major repair job. To replace the side girder sheet it would have been necessary to tear out the interior trim of the car to get at the rivets. Drilling and fitting a new plate would have been far from a simple or inexpensive job. To have attempted to replace the corner post or the damaged side posts would have added increased work, delay and expense.

Skillful welding work accomplished the results shown in the second illustration. Extreme care was required to avoid buckling the thin side sheets under the heat action of the welding torch, but the success with which the job was carried out is clearly shown by the final condition of the plate as shown in the illustration. A similar welding operation on the damaged steel corner post and splices in the damaged side posts transformed what would ordinarily have been a costly job into a comparatively simple and inexpensive repair.

New Cyanide Hardening Process in Chicago Shops

Improved Process Provides for Heating the Cyanide Solution from the Top and Thereby Effects Substantial Economics in Cost and Eliminates All Danger to the Operator

A MATERIAL improvement in the cyanide hardening process in general use has been perfected in the forge shops at the West Shops of the Chicago Surface Lines by Charles Ringstrom, foreman of that department. This improved process not only assures uniformly good results but also effects material economies in cost and amply protects workmen against the dangers of inhaling cyanide fumes.

In the steel pot bath method of cyanide hardening, which is used by most steel treaters of the present day, the parts are preheated in a forge or furnace and then submerged in a pot containing the red-hot melted cyanide solution. They are then taken out and quenched in water. Although this method gives a uniform treatment to the part, it does not produce that glass-hard surfacing that cyanide is capable of imparting to steel where the entire process is carried through in one atmosphere and one temperature. Carbon steels case harden best at their critical temperatures, 1,500 deg. to 1,700 deg. F., due to the high affinity of iron for carbon in its second allotropic state. It is not possible to attain safely more than 1,450 deg. F. in a cyanide solution in a bottom-heated steel pot. In the newly developed furnace the cyanide pot is heated from above, and it is this idea that permits a combination of all the ideal conditions for the practical, safe and economical hardening of steel with cyanide base carbonizers.

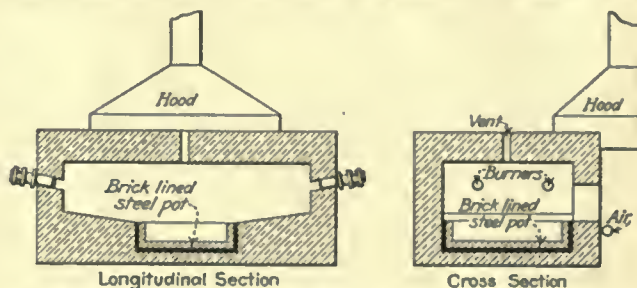
The new furnace is of the oven type. The brick-lined steel pot is located in the center of the floor, which is laid with a 10-deg. rise from the pot to the side of the oven, as shown in the accompanying illustration. Uniform temperatures in the 1,500 to 1,800 deg. F. range are maintained by the four No. 3 Hyperbo gas burners. It was found, after many changes and tests, that this burner steadily delivered a finely controlled

flame which maintains an even, uniformly circulated heat. Particular attention was given to the circulation current to confine their direct flow to a location above the cyanide solution in the pot, thereby maintaining a high temperature in the solution without agitation and consequent high volatilization.

All operations are performed inside the heat chamber. Large parts, weighing up to 12 lb., and small parts, down to $\frac{1}{4}$ -in. washers, are uniformly treated with equal facility in quantities up to 40 lb. per hour. The procedure is to place the parts to be treated on one of the inclined planes, where they are heated to 1,600 deg. F., then to submerge them in the cyanide pot for the required length of time, after which they are pulled out on the opposite incline plane, drained free of the solution and finally heated for penetration. They are then ready for quenching.

It will be noted that all operations are performed under a constantly maintained temperature, thereby insuring a very effective penetrative action; that the fumes from the cyanide mingling with the gas flames exclude all other air from the furnace, thus eliminating oxidation, and finally, that the liquid cyanide drains from the work into the pot after submerging, thus actually saving 50 per cent of the cyanide required for the same amount of work by the ordinary cyanide process.

The service life of the ordinary bottom-fired, pressed-steel cyanide pot is limited to a month or less. The



This Sectional Diagram of the New Cyanide Hardening Furnace Developed in the West Shops of the Chicago Surface Lines Illustrates the Arrangement for Heating the Solution from the Top, Using Gas as Fuel

corrosive effect of the cyanide solution, combined with heat, causes a rapid deterioration of the pot. The heating of the pot from the top, as is done in the new furnace, greatly diminishes the corrosive action of the solution on the container. After six months of operation the pot in this furnace, costing \$4, was found to be as serviceable as when first installed.

A record of production under the old and under the new processes shows the following results: For a period of 11 months, using the ordinary type process, 21,988 truck wear plates, each weighing 7 lb., were treated at a total cost of \$6,629.26. This is an average cost of \$0.0402 per lb. In the new process, under the same manufacturing conditions, miscellaneous parts weighing from one ounce to 12 lb. were treated during a 5-month period. In this case 69,500 lb. were treated at a total cost of \$1,490.78, giving an average cost of \$0.0214 per lb. of metal treated.

A material saving in the cost of steel pots is made with the new process, and it is conservatively estimated that 30 per cent of the carbonizing agent required in the common process is saved. There is a 50 per cent gain in the wearing quality of the metal treated. In addition to this, an operator produces 50 per cent more work during the 8-hour day with absolutely no danger of breathing cyanide fumes.

Electrical Equipment Causes Big Saving

Comparative Data from the Chicago, Milwaukee & St. Paul Railway Show
Definite Economy from Electrical Operation on Both Electrified
Divisions, Though Traffic Conditions Differ Greatly

THIS week the Chicago, Milwaukee & St. Paul Railway made public for the first time detailed figures of the relative costs of operating its Rocky Mountain divisions by electricity and by steam locomotives. The report was prepared by C. E. Oliphant, assistant to the comptroller in charge of statistics, under the direction of W. W. K. Sparrow, vice-president, and in consultation with R. Beeuwkes, electrical engineer in charge of the electrical installation. The figures include both operating expenses and carrying charges (the latter including depreciation) and have been brought to the same basis. This was done for the operating expenses as follows:

The electrical operating costs are the actual costs for

the year ended Dec. 31, 1923. The steam operating costs are based on the costs of the last year of steam operation, corrected where known to be incomplete as for some of the minor items, and then recalculated to cover the differences which have occurred in labor and material costs. In other words, the figures are restated so as properly to represent the price levels of 1923, or what the cost would have been if the divisions had been operated by steam. With regard to the savings with the electrical system through the use of regenerative electric braking, it was found that no existing data were available which would enable the brakeshoe wear to be determined with any accuracy for the condition of continuous and long application which, under steam operation, occurs on mountain grades. Therefore, a wear figure, believed at least to be conservative of 1 lb. of wear per 100,000,000 ft.-lb. of energy dissipated, was used. There is also a saving in draft rigging brake apparatus and wheel wear, all of which, for evident reasons, are indeterminable where cars move over many divisions. The amount of savings on account of these items was assumed to be the same as that resulting from the reduction in brakeshoe wear. This estimate is believed by the officers of the railway company to be conservative.

The comparisons of costs for the two motive powers are published in the accompanying tables and charts, the figures for which include only those accounts for both steam and electric operation which are affected by the type of motive power. Operating costs common to both steam and electric operation and carrying charges on investment in property commonly necessary to both forms of operation were omitted from these tables for the sake of simplicity.

The selection of accounts used was made after a careful study of the expenditures under each of the primary accounts of the operating classifications. Some of the accounts excluded as not being affected by change in power are without doubt affected to some extent by such a change, but the effect is so slight as to be negligible in comparison with the effects produced by other causes. Thus, "Maintenance of Track" is admitted by the company to be an expense unquestionably affected to some extent by the class or kind of power. It was felt, however, that the effect from other causes, such as weather, availability of money, cycles of renewal of parts, maintenance program, labor conditions, etc., are so much greater and so impossible of exact ascertainment for elimination, that this expense

SAVINGS RESULTING FROM ELECTRICAL OPERATION—COST LEVEL OF 1923

Years	Harrowton to Avery Electrical Operation began April and Nov., 1916		Othello to Tacoma Electrical Operation began March, 1920		All Electrified Sections	
	Volume of Traffic-Gross Ton Miles Frt. and Pass.	Net Savings by Electrification	Volume of Traffic-Gross Ton Miles Frt. and Pass.	Net Savings by Electrification	Volume of Traffic-Gross Ton Miles Frt. and Pass.	Net Savings by Electrification
1916	11,839,054,000	\$ 1,098,186			1,639,054,000	\$ 1,098,186
1917	2,677,097,000	1,641,369			2,677,097,000	1,641,369
1918	2,759,178,000	1,734,687			2,759,178,000	1,734,687
1919	2,894,083,000	1,885,037			2,894,083,000	1,885,037
1920	2,710,745,000	1,679,623	*691,674,000	* \$249,003	3,402,419,000	1,928,626
1921	1,812,714,000	658,651	664,238,000	12,363	2,476,952,000	671,014
1922	2,109,868,000	996,485	734,121,000	103,301	2,843,989,000	1,099,786
1923	2,247,102,000	1,152,508	748,496,000	119,285	2,995,597,000	1,271,793
1924	2,129,426,000	1,018,721	991,476,000	47,808	2,820,902,000	1,056,529
Total		\$11,868,247		\$531,760		\$12,400,007

(Tonnage and savings for 6 1/2 months.
*Tonnage and savings for 9 months

OPERATING EXPENSES DIRECTLY AFFECTED BY CHANGE IN POWER—HARLOWTON TO AVERY

I.C.C. Accts.	Classification of Expenses Description	STEAM OPERATION Costs of the Year 1916 Adjusted to the Price Levels of 1923			ELECTRICAL OPERATION Actual Costs of the Year 1922		
		Variable		Constant Frt. & Pass.	Variable		Constant Frt. & Pass.
		Freight (3)	Passenger (4)	(5)	Freight (6)	Passenger (7)	(8)
(1)	(2)						
201	Maintenance of Way and Structures:			\$ 94,472			\$ 95,208
221	Superintendence.....			23,800			
223	Fuel Stations.....			9,930			
233	Shops and Enginehouses.....			52,131			33,927
249	Signals and Interlockers.....						47,671
255	Power Substation Buildings.....						1,839
257	Power Transmission Systems.....						2,913
259	Power Distribution Systems.....						40,763
261	Power Line Poles and Fittings.....						18,379
271	Small Tools and Supplies (for M. of Elec. Prop. only)						647
	Total Maintenance of Way and Structures.....			222,716			341,238
301	Maintenance of Equipment:			120,194			105,440
309	Superintendence.....			17,055			19,163
308-11	Power Substation Apparatus.....	\$ 687,824	\$ 218,725		\$ 190,390	\$ 125,349	
309-11	Locomotive Repairs—Train.....	21,262	11,622		12,510	77	
314-17	Brake Shoe and Rigging, Wheel and Draft Rigging Wear.....						2,767
326	Trolley Maintenance Cars—Only.....						127,360
	Total Maintenance of Equipment.....	748,281	230,347	120,194	202,900	135,426	
371	Transportation:			70,240			61,407
377	Superintendence.....			17,055			17,055
379	Yardmasters and Yard Clerks.....						
379	Yard Switch and Signal Tenders.....	61,533		1,189	37,174	166	648
380-81	Yard Engines—Yard Motormen.....	30,644			17,950	110	
382-84	Fuel for Yard Locomotives—Yard Switch. Power Purchased.....	43,316					9,486
383	Yard Switching Power Produced.....						1,053
385	Water for Yard Locomotives.....	1,257			304	1	
386	Lubricants for Yard Locomotives.....				302	1	
387	Other Supplies for Yard Locomotives.....	908			4,131	26	
388	Enginehouse Expense—Yard.....	12,431		712			328
389	Yard Supplies and Expenses.....						
392-93	Train Engines—Train Motormen.....	400,421	121,841		231,352	77,778	
394-96	Fuel for Train Locomotives—Train Power Purchased.....	896,009	270,693				754,281
395	Train Power Produced.....						67,135
397	Water for Train Locomotives.....	24,939	7,556				
398	Lubricants for Train Locomotives.....	14,534	3,360		9,979	4,811	
400	Other Supplies for Train Locomotives.....	19,018	5,581		4,831	2,470	
401	Enginehouse Expense—Train.....	142,283	56,330		42,341	40,531	
402	Trainmen.....	317,041	94,649		197,067	94,849	
403	Train Supplies and Expenses (Train—Light and Heat)						12,883
404	Signal and Interlocker Operation.....			40,841			31,617
	Total Transportation.....	1,964,010	569,310	120,037	535,561	233,425	962,763
	Work Train Expenses—All Other than Included Above in M. of W. & S. adjusted to 1923 Work Train Miles.....			74,721			62,415
	Total for Operating Expenses Directly Affected.....	\$2,710,291	\$ 799,637	\$ 547,568	\$ 738,461	\$ 368,851	\$1,363,776
	(Gr. Tot. Stm. \$4,057,616; Gr. Tot. Elec. \$2,501,089)						
	Gross Tot. Miles in the Month—the Work Performed.....	1,758,726	**419,905		1,827,197	419,905	
	(Gr. Tot. Stm. 2,178,631; Gr. Tot. Elec. 2,247,102)						
	Cost per 1,000 Gross Ton Miles.....	\$ 1.54105	\$ 1.90438		\$ 40415	\$.87842	

**Variable"—Expenses considered to vary practically directly with volume of traffic; "Constant"—Expenses considered to remain practically constant for all volumes of traffic within a reasonable range.
*The actual for the period, 354,054,000, adjusted to the tonnage of electrical operation as the difference rests solely in the number of cars per train: Expenses adjusted to conform.

INVESTMENT IN AND CARRYING CHARGES ON THE PROPERTY PECULIAR TO EACH MODE OF OPERATION—HARLOWTON TO AVERY

ITEMS	Investment	Carrying Charges		
		Interest 5%	Depreciation S. F. Basis 6%	Total
Steam Operation:				
Fixed Property:				
Fuel and Water Stations, Cinder Pits, Etc.	\$ 630,000	\$ 31,500	\$ 18,900	
D. C. Signal System.....				
Totals—Fixed Property.....	\$ 630,000	\$ 31,500	\$ 18,900	\$ 48,180
Locomotives:				
Freight (incl. all Pusher and Work Service Locomotives).....	\$ 2,470,828	\$ 123,531	\$ 28,166	
Passenger.....	254,030	17,802	4,069	
Switch.....	78,508	2,930	806	
Totals—Locomotives.....	\$ 2,905,366	\$ 145,263	\$ 33,190	\$ 178,383
Totals—Steam Property.....	\$ 3,535,366	\$ 176,763	\$ 49,815	\$ 226,578
Electrical Operation:				
Fixed Property:				
Roadway Buildings.....	\$ 99,845	\$ 4,477	\$ 2,342	
Power Substation Buildings.....	535,157	26,758	3,361	
Power Substation Apparatus.....	1,859,353	92,968	21,263	
Power Transmission System.....	715,181	35,759	5,433	
Power Distribution System.....	3,800,512	144,531	23,269	
Power Line Poles and Fittings.....	1,091,721	54,586	50,110	
A. C. Signal System.....	\$ 197,446	8,472	1,274	
Engr.—Inst. during Construction and Maint.	325,871	16,294	3,354	
Maintenance Equipment.....	37,000	1,850	422	
Sub-Total.....	\$ 7,741,889	\$ 387,085	\$ 111,090	\$ 498,175
Rental of Transmission Lines—Credit.....		\$Cr. 2,780		\$Cr. 2,780
Totals—Fixed Property.....	\$ 7,741,889	\$ 384,325	\$ 111,090	\$ 496,415
Locomotives:				
Freight (incl. all Pusher and Work Service Locomotives).....	\$ 2,881,112	\$ 144,056	\$ 32,845	
Passenger.....	927,408	46,370	10,573	
Switch.....	111,864	5,578	1,272	
Totals—Locomotives.....	\$ 3,920,384	\$ 196,004	\$ 44,690	\$ 240,694
Totals—Electrical Property.....	\$ 11,661,773	\$ 580,329	\$ 155,780	\$ 736,109
Increase in Carrying Charges—Account Electrification.....				\$ 509,531

*Electrical operating property at actual cost 1914-15-18: Steam operating property priced as of the costs obtaining during the same period (1913).
†Net increase in investment chargeable to electrification included under electrical operation

INVESTMENT IN AND CARRYING CHARGES ON THE PROPERTY PECULIAR TO EACH MODE OF OPERATION—OTHELLO TO TACOMA

ITEMS	Investment	Carrying Charges		
		Interest 6%	Depreciation S. F. Basis 6%	Total
Steam Operation:				
Fixed Property:				
Fuel and Water Stations, Cinder Pits, Etc.	\$ 507,010	\$ 30,421	\$ 13,436	
D. C. Signal System.....	812,900	36,730	9,788	
Totals—Fixed Property.....	\$ 1,319,910	\$ 67,141	\$ 30,229	\$ 97,370
Locomotives:				
Freight (incl. all Pusher and Work Service Locomotives).....	\$ 2,138,785	\$ 128,147	\$ 34,344	
Passenger.....	430,231	25,814	4,906	
Switch.....	144,224	8,653	1,644	
Totals—Locomotives.....	\$ 2,713,240	\$ 162,614	\$ 30,897	\$ 193,511
Totals—Steam Property.....	\$ 3,829,250	\$ 229,755	\$ 61,126	\$ 290,861
Electrical Operation:				
Fixed Property:				
Roadway Buildings.....	\$ 114,215	\$ 6,853	\$ 3,077	
Power Substation Buildings.....	452,808	27,168	2,878	
Power Substation Apparatus.....	1,476,964	84,616	18,955	
Power Transmission System.....	549,621	27,971	8,072	
Power Distribution System.....	2,190,401	131,424	18,822	
Power Line Poles and Fittings.....	950,553	47,994	40,390	
A. C. Signal System.....	780,000	46,800	8,558	
Engr.—Inst. during Construction and Maint.	621,510	37,291	7,645	
Maintenance Equipment.....	27,000	1,620	305	
Sub-Total.....	\$ 7,178,991	\$ 430,739	\$ 101,988	\$ 532,727
Rental of Transmission Lines—Credit.....		\$Cr. 26,842		\$Cr. 26,842
Totals—Fixed Property.....	\$ 7,178,991	\$ 404,897	\$ 101,988	\$ 506,885
Locomotives:				
Freight (incl. all Pusher and Work Service Locomotives).....	\$ 3,065,280	\$ 183,917	\$ 34,944	
Passenger.....	1,035,890	62,141	11,807	
Switch.....	48,620	2,911	553	
Totals—Locomotives.....	\$ 4,149,790	\$ 248,968	\$ 47,304	\$ 296,273
Totals—Electrical Property.....	\$ 11,328,681	\$ 653,866	\$ 149,292	\$ 803,156
Increase in Carrying Charges—Account Electrification.....				\$ 322,377

*Electrical operating property at actual cost 1917-18-19: Steam operating property priced as of the costs obtaining during the same period (1916).

should be classified as not being affected by change in power, though other items in the primary account of maintenance of way and structures were included. Work train expenses have been separated and included as expenses directly affected by change in power for several reasons, one of which is that losses under steam operation are eliminated by the use of electric motors in work train service. The costs of the two periods have been adjusted to the same amount of work train service.

Costs of electric power for the electric division are based upon a minimum total payment corresponding to the respective amounts of energy for which the railway company had exercised options during 1923 for the different sections. Where these amounts were not sufficient to handle the increased traffic, the power cost was increased on the basis of the additional power required.

COST AS AFFECTED BY VOLUME OF BUSINESS

Of course the total tonnage moved in the year selected was not the same for steam and for electric operation. Therefore, to make the comparison exact, the cost items affected by a change from steam to electrical operation were separated between those which within reasonable limits remain constant for different volumes of traffic and those which vary directly with the volume of traffic. The latter items were further separated between the passenger and freight services. With these separations, it was easy to make

a comparative statement of figures on investment and depreciation based on the same tonnage. In determining the figures on investment, only the power equipment facilities and appurtenances directly related to each system of motive power were considered.

In tabulating the investment in the property involved,

OPERATING EXPENSES DIRECTLY AFFECTED BY CHANGE IN POWER—OTHELLO TO TACOMA

I. C. C. Accts.	Classification of Expenses	STEAM OPERATION			ELECTRICAL OPERATION		
		Costs of the Year, August, 1912, to July, 1919, inclusive, Adjusted to the Price Levels of 1922			Actual Costs of the Year 1923		
		*Variable	*Constant	*Constant	*Variable	*Constant	*Constant
(1)	(2)	Freight (3)	Passenger (4)	Freight & Pass. (5)	Freight (6)	Passenger (7)	Freight & Pass. (8)
201	Maintenance of Way and Structures:						
201	Superintendence.....		\$ 48,293				\$ 48,277
201	Water Stations.....		8,373				
201	Fuel Stations.....		5,218				
201	Signals and Interlockers.....		14,334				
201	Power Substation Buildings.....		32,302				81,343
201	Power Transmission Systems.....						2,047
201	Power Distribution Systems.....						3,179
201	Power Line Poles and Fittings.....						12,066
201	Small Tools and Supplies (for M. of Elec. Prop. only).....						308
201	Totals Maintenance of Way and Structures.....		111,310				132,013
301	Maintenance of Equipment:						
301	Superintendence.....		31,100				22,306
301	Power Substation Apparatus.....						7,891
301-11	Locomotive Repairs—Train.....	\$ 328,447	\$ 128,174		\$ 78,549	\$ 90,708	
301-11	Locomotive Repairs—Switch.....	24,141			2,958		
301-17	Brake Shoes and Rigging, Wheel and Draft Rigging Wear.....	10,000	7,000				714
301	Trolley Maintenance Cars—Only.....						
301	Totals Maintenance of Equipment.....	368,688	134,174	81,105	81,507	90,708	30,911
371	Transportation:						
371	Superintendence.....		35,097				34,126
371	Yard Conductors and Yard Clerks.....		6,708				3,208
371	Yard Conductors and Signal Tenders.....	60,500			10,098		
371	Yard Engineers—Yard Motormen.....	25,629			8,396		578
371-41	Fuel for Yard Locomotives—Yard Switch, Power Purchased.....	24,763					8,714
371-41	Yard Switching Power Produced.....						447
371	Water for Yard Locomotives.....	608					
371	Lubricants for Yard Locomotives.....	508			106		
371	Other Supplies for Yard Locomotives.....	836			44		
371	Engineroom Expenses—Yard.....	8,845			1,196		
371	Yard Supplies and Expenses.....		98,674				95
371	Train Engineers—Train Motormen.....	232,328	186,444		92,334	38,095	
371-41	Fuel for Train Locomotives—Train Power Purchased.....	490,307					**219,634
371-41	Train Power Produced.....						53,301
371	Water for Train Locomotives.....	11,710	4,348				
371	Lubricants for Train Locomotives.....	8,694	1,784		4,800	2,171	
371	Other Supplies for Train Locomotives.....	7,211	2,778		3,685	1,990	
371	Engineroom Expenses—Train.....	45,998	29,382		14,554	10,127	
371	Trainsmen.....	264,328	60,644		107,163	47,898	
371	Train Supplies and Expenses (Train—Light and Heat).....				7,739		
371	Signal and Interlocker Operation.....						14,380
371	Totals Transportation.....	1,161,385	355,100	68,414	343,019	113,813	428,510
371	Work Train Expense—All Other than included Above in M. of W. & S. adjusted to 1923 Work Train Miles.....			50,433			39,679
371	Totals for Operating Expenses Directly Affected (Gr. Tot. Sum. 22,277,457; Gr. Tot. Elec. 11,284,552).....	\$ 1,328,998	\$ 401,274	\$ 208,160	\$ 381,256	\$ 174,516	\$ 631,110
371	Gross Ton Miles in the Above—The Work Performed.....	805,330	**208,681		537,734	308,661	
371	(Gr. Tot. Sum. 1,014,511; Gr. Tot. Elec. 746,406)						
371	Cost per 1,000 Gross Ton Miles.....	\$ 1.66265	\$ 2.35419		\$.70926	\$.56398	

*Variable—Expenses considered to vary proportionally directly with volume of traffic; *Constant—Expenses considered to remain practically constant for all volumes of traffic within a reasonable range.
**Constant up to a total of 805,000 Gross Ton Miles for Freight and Passenger Service; those increased in freight service as estimated for greater volume of traffic. (The amount to be added at 1,014,511,000 G. T. M. is \$36,307.00.)
***The actual for this period, 1923, adjusted to the tonnage of electrical operation as the difference ratio solely in the number of cars per train due to difference in train rostering. Expenses adjusted to conform.

the same practice was followed as with the operating expenses, namely, to include only the equipment facilities and appurtenances directly related to each type of equipment. For example, in steam operation, the steam locomotives and the fuel and the water stations were included, and in electrical operation the locomotives, the transmission and distribution systems, substations, etc. The signal systems were also included, as it was necessary to change the d.c. system formerly used with steam for the a.c. system when the road was electrified.

The figure taken as the investment for the property peculiar to electrical operation was the actual cost of installation—i.e., on the Coast division the prices obtaining in 1918 (1917 to 1919), and on the Rocky Mountain and Missoula divisions the prices obtaining in 1915 (1914-1916). The investment in the property peculiar to steam operation was based upon the actual cost, modified and adjusted to the price levels as of the electrical installations—i.e., on the Coast division as of 1918 and on the Rocky Mountain and Missoula divisions, which extend from Harlowton to Avery, as of 1915.

The carrying charges computed interest and depreciation. The interest rate has been taken as the rate paid by the railway during the different periods of installation—for the Coast division 6 per cent and the Rocky Mountain and Missoula divisions 5 per cent. Depreciation has been computed upon the sinking fund basis, using an interest rate of 6 per cent.

THE SYSTEM INVOLVED

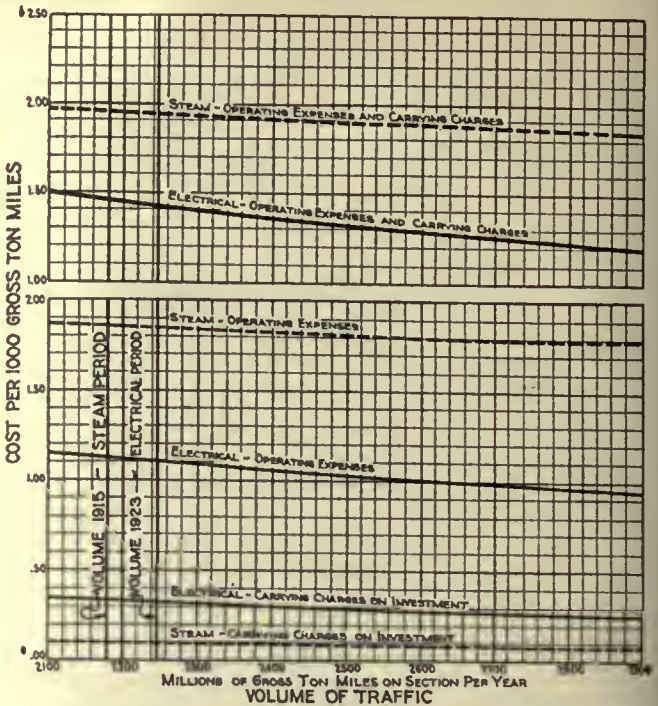
The miles of track involved in electrification are as follows:

MILES OF ELECTRIFIED TRACK CONSIDERED, CHICAGO, MILWAUKEE & ST. PAUL RAILWAY.			
	—Miles of Track—		Operation Dates
	First Main	Other	
Harlowton to Deer Lodge.....	226	66	April, 1916
Deer Lodge to Avery.....	212	62	November, 1916
Othello to Tacoma (helper service).....	208	72	August, 1919
Othello to Tacoma (through service).....	2	72	March, 1920
Tacoma Junction to Tacoma (passenger)....	2	72	April, 1920
	648	200	

The direct-current overhead trolley system of electrification is used. This current is not generated by the railway, but is purchased from hydro-electric stations along the line. It is received at taps in the company's high-tension lines, transmitted to substations where it is stepped down from three-phase a.c. at 100,000 volts to a working voltage of 2,300 and then converted to motor-generators to d.c. at 3,000 volts for distribution on the trolley. The motors of the locomotives are so constructed as to act as generators when descending grades, thus returning current to the line and controlling the speed of trains without mechanical braking. Full technical details of the electrification have been published in this paper.

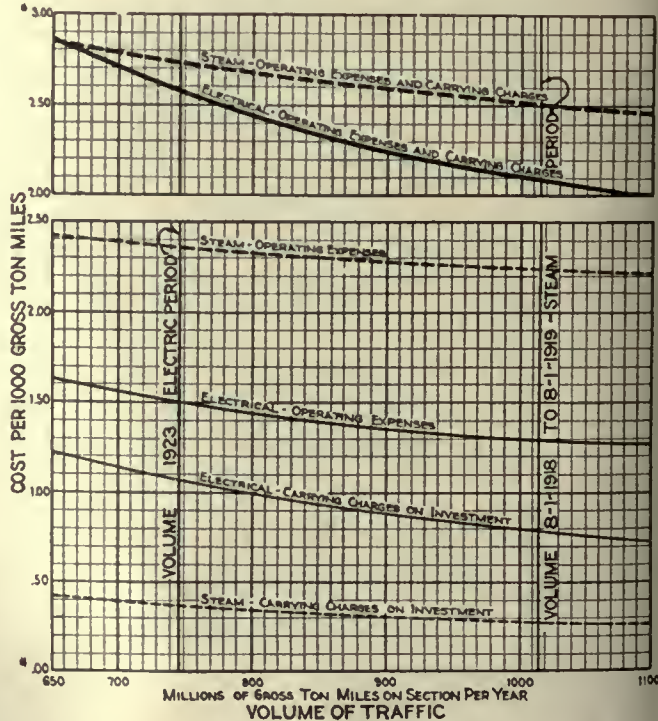
STATISTICS

The first of the accompanying tables shows for the years since the beginning of electrical operation the net saving from electrical operation, using for steam operation the actual cost of the last 12 months of such operation—adjusted to the cost obtaining in 1923; and for electrical operation, the actual cost as determined for the year 1923. The net savings shown are obtained by deducting from the savings in operating expenses the carrying charges of interest depreciation on the additional investment required by the electrification, which, as shown in two of the subsequent tables, amounted to \$15,625,739.



Comparative Costs per 1,000 Gross Ton-Miles—Passenger and Freight—Of Operating Expenses and Carrying Charges as Investment in Property Directly Affected by Change in Power—Harlowton to Avery

From this table it will be seen that for the year 1923, with its comparatively low tonnage, the net saving from electrical operation of the two sections amounted to \$1,271,793. For the minimum tonnage so far experienced, which was in the year, 1921, the savings amounted to \$671,014. The maximum tonnage so far experienced was in 1919. Had the section from Othello to Tacoma been under electrical operation during that year, the savings for the two sections would have amounted to \$2,355,199. Detailed figures of cost



Comparative Costs per 1,000 Gross Ton-Miles—Passenger and Freight—Of Operating Expenses and Carrying Charges on Investment in Property Directly Affected by Change in Power—Othello to Tacoma

on the bases described are given in the other tables shown.

The two charts present the savings per 1,000 gross ton-miles, freight and passenger, resulting from electrical operation in place of steam. In these charts it will be seen that the volume of traffic in the steam and electrical operating years were nearly the same for the Rocky Mountain and Missoula divisions, but in the case of the Coast division the steam operating year included a considerably greater volume of traffic than did the electrical operating year—a situation favoring steam operation to some extent in the comparative figures.

NO INDIRECT SAVINGS CREDITED

No savings were credited to electric operation which were not directly ascertainable, as for example the possible increased revenue due to the release of equipment used in the transportation of coal under steam operation. Similarly, no credit was given electric operation for the better utilization of freight equipment due to faster movement, less wear and tear on road and equipment, reduced station expenses and similar expenses affected by the number of trains required to handle a given tonnage. In the case of all of these items it was impossible to determine an exact monetary value for these incidental advantages. In the same way, no credit is given for the increase in passenger revenue resulting from the attractiveness and greater comfort of travel under electrified operation.

German Comment on Foreign Practice Report

A Supplement of the Report of the Foreign Practice Committee at Atlantic City Convention of the American Electric Railway Association,
Prepared by a German Writer

THE report of the committee on foreign practice of the American Electric Railway Association, presented at Atlantic City last October, has attracted considerable attention on the continent of Europe as well as in England and the United States. The German comment is instanced by an extended abstract of the report, extended through three issues of *Verkehrstechnik*. It was written, with comments, by General Manager Stein of the Hamburg Elevated Railway, who was recently in the United States on a tour of inspection of American electric railways. Mr. Stein says many complimentary things about the report of the committee on foreign practice, among them that the members were careful observers and that while they may have seen many things through American spectacles, they accumulated a vast amount of valuable data. The omission of Germany from the itinerary, however, Mr. Stein says, is hard to understand, in view of the fact that so many American railway men have visited Germany during the last three or four years. Evidently he did not realize the limited time at the disposal of the committee.

The author then mentions a number of developments of electric railway interest which the committee might have seen in Germany, and this summary is published here somewhat condensed, as it may serve as a possible unofficial supplement, by a prominent German engineer and railway manager, to the report of the committee. Mr. Stein says:

They could not only have seen interesting historical objects, like the first electric car in the world, made by Siemens, but also developments which constitute today a decided advance in electric railway engineering and operating developments. Some equipment of chiefly German character was seen by the visitors in Switzerland, such as single-phase, main-road electrification and the bow type of trolley for surface cars. Notable developments in overhead line construction and locomotives for single-phase main-line operation, however, could have been studied to better advantage in Germany, particularly unusually large single-phase motors. It would have been possible on the urban and suburban lines in Berlin to have observed the latest types of direct-current equipment. Mercury-arc rectifier sets, much larger than those in France and Switzerland, could also have been inspected in Germany. The American visitors would have had an opportunity of observing the excellent results obtained on surface lines with brakes of the short-circuit, disk or solenoid types, which have given in this service better general results than air brakes or magnetic rail brakes. Of the latter kind of brakes, some notable models could have been seen in use on track with heavy grades, so arranged as to permit regeneration.

The visitors could also have learned how Germany has succeeded in economizing in the use of material and electrical energy. They would have found very interesting improvements in armature bearings and axle bearings, particularly in the use of roller and ball bearings and new types of inexpensive anti-friction bearing metal such as Lurgi metal. Oil-electric cars and storage-battery cars could have been seen in operation. Data could have been obtained in regard to progress in the development of rail sections. It should be remembered that the first rolled girder rail was produced in Germany (in 1873) and that the thermit-welding process was a German invention. The committee could have seen, in Dortmund, a four-wheeled car with a 4-m. (13-ft. 2-in.) wheelbase, equipped with a high-speed motor and automobile type of gear transmission. If they had visited Hamburg, they would have seen a new six-wheel auto bus. They would also have had an opportunity to observe important developments in signaling systems, such as the trouble signals in Hamburg, new methods of fare collection and accounting.

But most important of all, the committee would have found how common the practice is in Germany to plan the extension of city railway systems so as to fit in with future building operations. In many countries this is considered a practically unattainable ideal, but in Germany laws have been passed in this respect and good results are being obtained. Finally, they would have been able to see how engineer and architect, when working together, can design such attractive structures for use with subways and elevated railroads that these structures harmonize with the general architecture of the city.

Aurora-Elgin Time-Table Carries Much Local Information

INSTEAD of carrying advertisements, the back of the new time-table folder of the Aurora, Elgin & Fox River Electric Company contains useful information for commercial men as well as regular patrons. The interurban service time-table is printed on one side of an eight-page folder which measures 6½ in. x 3½ in. On the other side of the sheet is information relative to Aurora, Elgin and the small towns through which the interurban line passes. Lists of clubs, theaters, hotels, hospitals, parks, banks and manufacturers are given. In the tabulation of manufacturers in Aurora and Elgin opposite each manufacturer's name is the name of the local street car line which passes near it. This information gives the commercial traveler an alphabetical list of manufacturers, their addresses and how to reach them.

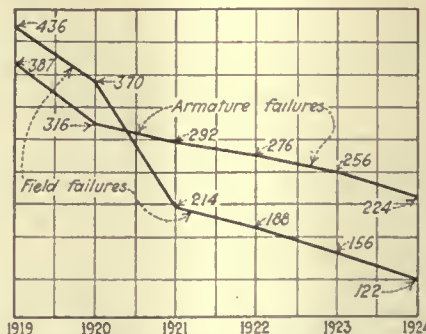
In addition to this information, schedules of city car operation in Aurora and Elgin appear in the time-table. These schedules give the time of departure at the center of town and at the terminals for cars on all lines.

Equipment Maintenance Notes

Dipping and Baking Motor Frames Reduces Field Failures

A REDUCTION to about one-quarter of the former number of field failures has been made by the Washington Railway & Electric Company, Washington, D. C., during the past 5 years. Dipping and baking of armatures and fields was begun on an extensive scale in 1920 and dipping and baking of frames with fields in place was started in 1922. Although many factors have contributed to this result, it is felt by the company that the practice of dipping and baking motor frames with the fields in place has been an important reason for the improved performance record.

For this purpose an electric baking oven and dipping apparatus, as shown in the accompanying illustration, was built by the railway and installed in its P Street shops in 1922. Just before the motor frames are to be returned to service and after the new fields have been installed they are baked and dipped. The frame is preheated at 200 deg. F. for 7 hours in the electric oven.



Total Armature and Field Failures
The effect of dipping and baking on the number of field and armature failures is clearly shown by the marked reduction since 1920.

Small trucks used to move motors around the shops are run right into the baking oven.

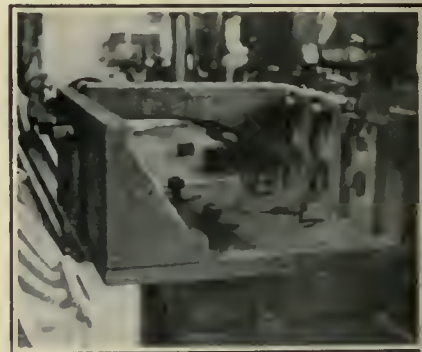
After the frame has been preheated all holes are plugged and it is suspended by the chain hoist above a shallow varnish pan. Wooden disks cover the openings usually occupied by the bearing housings. The frame is then filled with varnish from a tank above the pan. This is allowed to remain for 10 or 15 minutes until all bubbling ceases, when the varnish is allowed to run out into the pan. From the pan it flows through a pipe to an underground tank. After the pan is empty, a

valve closes the pipe opening. A storage air tank located near by on the wall is connected to the underground varnish tank, so that the liquid can be raised by compressed air to the tank shown in the accompanying illustration.

After the frames have been thus impregnated with varnish they are allowed to cool. It is not thought necessary to return them to the ovens for further baking. The heat which the iron has accumulated during the 7 hours previous baking is retained for a sufficiently long time to dry out the varnish properly. All motor frames are treated in this way when they are returned to the shop for their regular 60,000-mile overhauling.

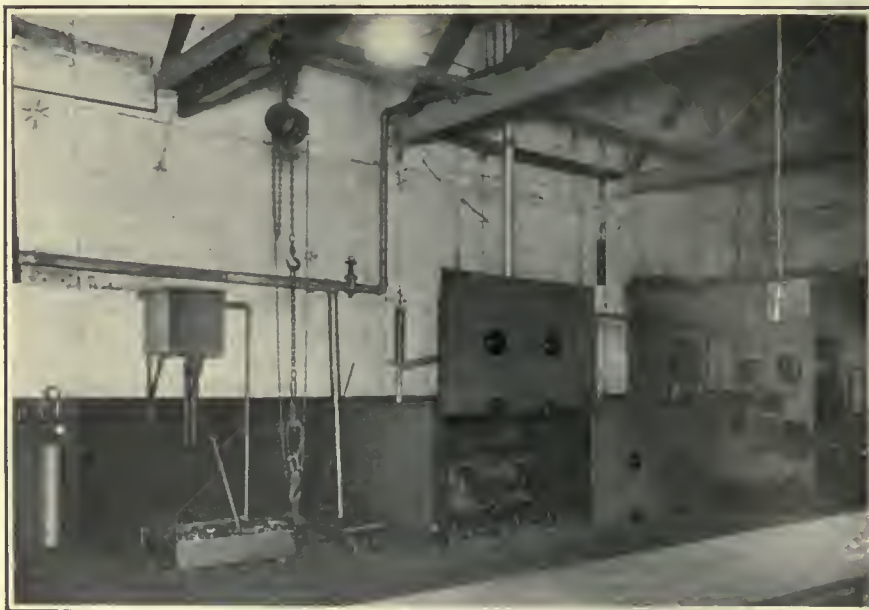
Pedestal Jaws Finished in Shaper

IN THE shops of the Gary Street Railway, Gary, Ind., cast-steel, bolted-type pedestal jaws, when badly worn, are replaced with new cast-



Four Pedestal Jaw Castings Are Machined at One Time in This Fixture

ings. These replacement castings are finished four at a time in a fixture attached to the bed of a shaper. These are held at one end by means of square-headed bolts and at the other end by setscrews. The fixture consists of a heavy steel base with uprights at two edges. The base is a piece of 1-in. rolled steel approximately 24 in. square. One upright is of 1½-in. steel, grooved out to receive the shoulders on the top of the pedestal casting. Two ¾-in. square-headed bolts are used to fasten each casting to this upright.



Apparatus for Dipping and Baking Motor Frames with Fields in Place

On the right are the plugs which are used to stop up openings in the frames. In the center is the electric baking oven, containing two motor frames. To the left is the

varnish tank and the pan into which the varnish is emptied after the frames have been treated. Air control equipment is shown at the extreme left.

Dick Visits the Centerville Shop And Makes a Suggestion



DICK PRESCOTT and Steve White of the Consolidated Railway & Light Company finally reached the Centerville railway shop. The master mechanic proved to be a very pleasant fellow. After Dick and Steve had explained to him that their inspection trip was for the purpose of gathering new ideas and information on current methods, the three started out through the shop. As they went over the work of various departments, many questions of maintenance practice were freely discussed between the two visitors and the master mechanic.

After several hours they found themselves in the armature room with the foreman of that department. While awaiting the return of the master mechanic, who had been called to the telephone, the subject of bearing maintenance came up.

"How do you decide when bearings should come out?" asked Dick. "Do you have definitely established limits of wear?"

"Why, let's see; I don't know how the stations are handlin' that now; wait'll I see. Oh, John, come 'ere a minute, will yuh?"

A husky, grimy workman approached the group in response to the foreman's call, wiping his hands on a piece of waste as he came.

"Say, John, how do those fellahs out at the station tell when bearin's have to come out?"

John hesitated a moment. Then he replied, "Why, they put a bar up under th' pinion and feel when she's gettin' pretty loose."

"Well, do they have a definite limit of wear allowance?" asked Dick.

"Sure, they take 'em out before th' armature tears up on th' poles. They feel when she's pretty loose with the bar. Sometimes they look at the armature to see if she's rubbin'."

"How about axle bearings?" questioned Dick.

"Oh, you can tell when they're gettin' pretty thin by heavin' up on th' motor with a bar."

"Well, then, you don't set a certain limit of wear and then take them out when they've reached that point?"

"Huh?—Oh, they jus' take 'em out when they look pretty loose."

As the master mechanic rejoined the group, the armature room foreman nodded to John, who returned to his bench, still wiping his hands on the piece of waste.

"What mileage do you get from gears and pinions?" asked Dick, addressing the master mechanic.

"Why, we don't have a record of the mileage of each one. I think we're gettin' pretty good mileage from the gears we've got, but I'm afraid they're a little too hard. We do have lots of trouble from broken teeth. Sometimes, when one piece breaks out it gets jammed in the teeth and bungs up the whole gear, and we've had some shafts break when they jammed. It sure makes a mess of the armature when a pinion breaks."

"We've just been talking about axle bearings," replied Dick. "Don't you think letting the bearings go too long might cause some of that breakage?"

"I don't know," replied the master mechanic. "There may be somethin' in that, though—we do get a ridge worn in the pinion face sometimes, out near the end of the tooth."

"I'm beginning to believe," said Dick, "that we've all been too economical on this matter of bearings, and that establishment of definite limits of wear would not only keep our gears fitting better but would reduce a lot of noise and vibration."

"I don't know but what there's some truth in what you say. If you get any more dope on that, I'd like to get hold of it."

"Fine!" said Dick. "I'll be glad to drop you a line when we get back."

The other upright contains four setscrews of $\frac{1}{2}$ in. diameter for steady-ing the small ends of the pedestal jaws. This upright may be removed from the base so that the castings may be easily mounted in the permanent upright. The jaws are first fastened to the permanent upright, after which the movable upright is placed in position. The setscrews are then run in to hold the castings. This set-up requires less than 10 minutes to make and allows four jaws to be machined at one time. The entire fixture was constructed in the shop from materials on hand and has proved handy in expediting this particular machining job.

Clamp for Holding Armatures Vertically

ARMATURES are dipped with the commutator end up in the shops of the Department of Street Railways, City of Detroit. For holding the armatures while supported by the hoist and also during handling, a clamp has been designed to fit the upper end of the armature shaft. This method of support keeps the clamp free from the compound during dipping and also facilitates rapid handling.



Clamp Applied to Armature Shaft to Support It in Vertical Position

The clamp consists of a casting with hook top. Two copper jaws are arranged to slide inside the casting, one being of V-shape, which is stationary, the other having ends which fit in slots of the casting to a t as guides. After placing the clamp over the end of the shaft, it is tightened by means of an eyescrew. The copper pieces which bear against the shaft prevent injury and at the same

time insure a tight clamping action, so that there is no danger of the clamp slipping.

Testing Drawbars on Cars

DRABARS on the cars of the Milwaukee Electric Railway & Light Company are tested by coupling and uncoupling with stationary drawbars mounted on pillars between tracks at both ends of the transfer table bay. The tests are made at the Cold Spring shops. A rack on each side of the bay is equipped



A Rack Mounted on a Carhouse Pillar Between Tracks Contains Two Types of Drawbars to Which a Car on the Transfer Table May Be Coupled for Testing the Coupler and Draft Rigging

with one city type and one interurban type drawbar head. Both of these are identical in every detail with the types of couplers used on the cars. The rack is so mounted that the height of the drawbar heads on the rack is the same as the height of the drawbars on the cars.

Inasmuch as all cars entering and

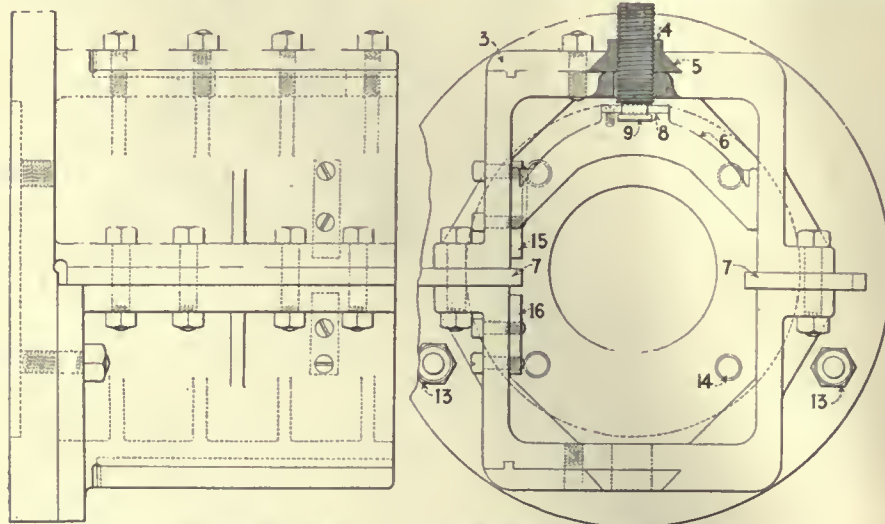
leaving the repair shop floor are handled by the transfer table, they must necessarily pass by the racks. In this method of testing it is only necessary to stop the table at the proper place to line up the drawbars. Coupling and uncoupling are accomplished in the usual manner, the car being moved back and forth on the transfer table under its own power.

It has been found that visual inspection, or inspection with especially designed gages will not always disclose defects in the draft rigging, so that a more reliable system was needed. This practical method of testing by actually coupling with stationary drawbars has proved very reliable and actually discloses irregularities in the coupling devices which would be difficult of detection by any other system.

Lathe Chuck for Axle Bearings

THE difficulty frequently experienced in chucking axle bearings for boring is overcome in the Hillcrest shops of the Toronto Transportation Commission by use of a special chuck, shown in the accompanying illustration, which holds the bearing securely for reboring. The self-centering arrangement makes adjustment easy and saves much time and labor.

The chuck is bolted to the face plate of the lathe by stud bolts through the holes, No. 14 in the accompanying drawing. When in position the locating pads, which are No. 7 in the sketch, have one surface on the center line of the face plate. The



Axle-Bearing Chuck Used for Machining Bearings by the Toronto Transportation Commission

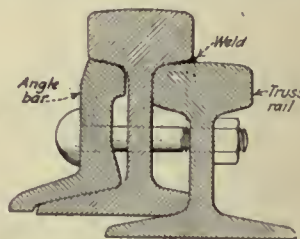
(3) Cast-iron nut clamp, (4) clamping steel, (9) tool steel wearing plates, (13) screw, (5) bronze nuts, (6) cast-iron bearing clamp, (7) locating pads, made of tool steel, (8) retaining plates of machine

bottom key.

axle bearing when placed in position has its split surface resting on the locating pads. The clamping screw at the top is then screwed down, which forces the clamping body down so as to hold the bearing firmly in position. After this has been done, the clamping screw is held firmly by the nut No. 5 and also by a nut clamp No. 3, which prevents any loosening.

Truss Rail for Repairing Rail Joints

ABOUT 200 rail joints with angle bars worn so badly that they did not give proper support were reconstructed by the Lincoln Traction Company, Lincoln, Neb. They were repaired by using a 6-ft. length of scrap T-rail of the same section as the rail to be repaired. The section of rail was drilled with the same spacing of holes as the angle bars, and was then driven under the out-



Truss Rail Construction Used for Repairing Worn Joints

side at the joint as is shown in the accompanying illustration. One angle bar was used on the inside of the joint which was bolted through the running rail tightly to the truss rail. In addition, the two rail heads were welded along the seam. This made a very firm joint almost equal to continuous rail. The length of the truss section was sufficient to rest on four ties.

Precautions in Replacing Field Coils

THE following points are well worth following while overhauling or repairing the field windings of railway motors:

1. The field coils and motor frames should be cleaned and painted.
2. Care should be used to make certain that field coils are placed properly in the frames, so as to give the proper polarity.
3. The use of a winding diagram will aid the man who is connecting the field coils, and assist in preventing wrong connections.
4. The polarity of each pole should be checked after coil is installed.

5. Where coils are connected by means of cable leads, connections between coils should be made by butting the ends together and then covering the joint with a copper sleeve, which is soldered in place.

6. When coils have terminals, the end of the cable which fits into the terminal should have a metal sleeve soldered over the wire. This will prevent damage to the ends of the wire and insure a tight connection when the terminal screws are in proper position.

7. The ends of cables which connect to brush-holders should also be provided with metal sleeves or terminals that can be securely clamped and locked to the brush-holder casting.

8. All wiring around the frame should be securely anchored to the frame to prevent vibration and keep the insulation from being rubbed or cut by rotating parts.

9. Motor leads coming out of the frame should be protected by insulated bushings.

10. Coils should be spring-sup-

ported, and where necessary they should be backed up by washers of either metal or fiber, well painted.

11. Springs and washers should be taped temporarily to the coils while they are being replaced in order to keep the parts from working out of place and getting in between the pole and pole seat during assembly.

12. The surface of the pole and pole seat should be cleaned carefully in order to insure a good close fit when the bolts are drawn up tight.

13. A lock washer should be placed under each nut, and white lead added over the nut after tightening to prevent the entrance of water.

14. Poles should never be pounded into place with a sledge. The use of a wooden block or piece of soft metal will prevent damage.

15. After assembling, the poles should be sounded with a small hammer to insure that they are drawn up tight.

16. Where dipping and baking are carried out, best results are obtained from dipping and baking the entire frame after the coils are in place.

with heavy felt washers on each side of the bearing housing to keep out dust and grit.

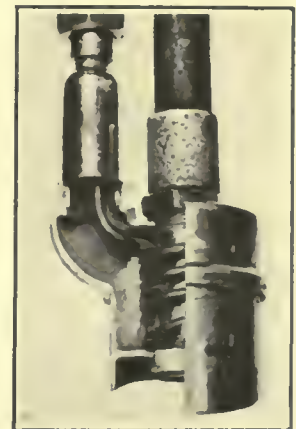
The spindles are unusually heavy and are made of high-grade steel, accurately ground. Flange washers are machined all over to provide accurate balancing. All inner flanges are firmly keyed to the spindle, but can be removed easily by hand. The machines are furnished with either direct or alternating current motors.

Electric Sandpipe Heater

A TYPE of electric sandpipe heater for use on electric cars and locomotives to keep the lower end of the sandpipe dry and prevent clogging is being marketed by the Universal Electric Sandpipe Heater Company, Philadelphia, Pa. This heater is



Electric Sandpipe Heater as Installed on Locomotive



Section of Sandpipe Heater Showing Interior Construction

arranged to screw into the end of the sandpipe and a separate connection is provided for the conduit which carries the electrical connections. Standard armored cable can also be used. The function of the device is to keep the end of the sandpipe dry, as in stormy weather wet sand will not flow freely from the lower end of the sandpipe and the particles which stick to the sides of the pipe will eventually close the outlet.

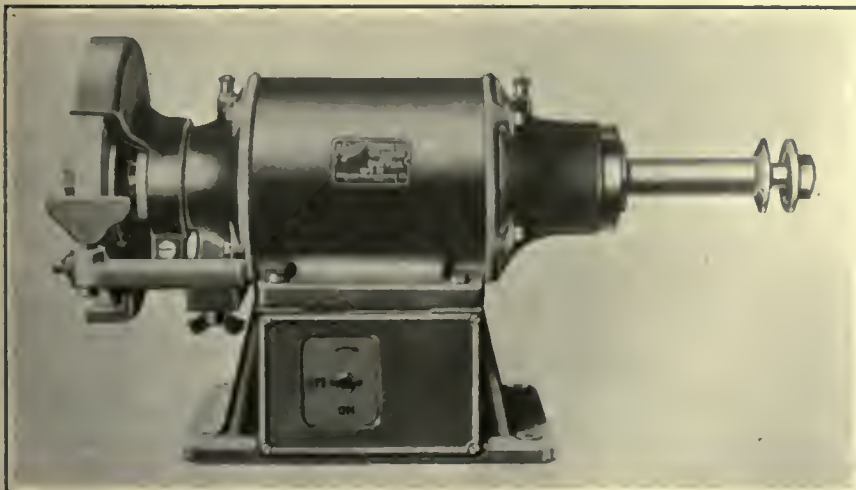
The method of mounting and the construction of the device are shown in the accompanying illustrations. Inside the shell of the main heater

New Equipment Available

Grinding and Buffing Machines

A COMBINATION grinder and buffer of bench type and with floor-stand combination is being placed on the market by the Hisey-Wolff Machine Company, Cincinnati, Ohio. The bench machine is made in $\frac{1}{2}$ -hp. and 1-hp. sizes and is designed with an open type of spindle extension. The floor type machine

is also made in $\frac{1}{2}$ -hp. and 1-hp. sizes, but is regularly furnished with encased spindles. These machines can be used for a large variety of shop work requiring the use of a grinding wheel, buffing wheel, wire brush or rotary wire rasp wheel. The machines with encased spindle are fitted with four ball bearings, while the open-spindle machines require only two. All bearings are completely inclosed, and are provided



This Bench Type Combination Grinder and Buffer Has an Open Spindle Extension

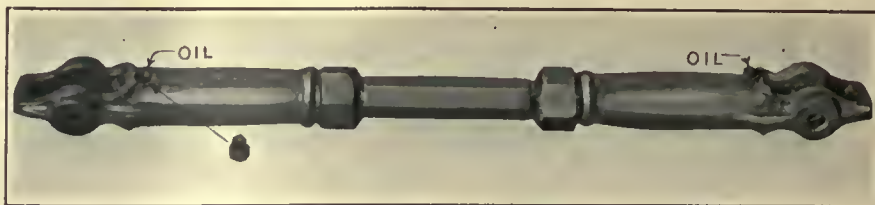
casting and around the lower end of the sandpipe is fitted the heating element. This consists of a length of Nichrome wire inclosed in but insulated from a metallic tube. This heating element is bent to a spiral form so as to surround the sandpipe, and the two leads for electrical connections are brought out through a separate opening in the casting. The heating element is made by the General Electric Company, Schenectady, N. Y.

When installed on electric cars or electric locomotives, the heating element is connected in series with one of the lighting circuits. The voltage and amount of current which passes through the element are thus reduced without the necessity of providing an additional external resistance.

A dependable flow of sand is essential to safe operation of electric cars and this sandpipe heater overcomes the difficulty of stoppage due to moisture and freezing conditions.

Lubricated Brake-Rod Casting

A FORM of brake-rod casting used by the J. G. Brill Company, Philadelphia, Pa., for the past two years on its type 79-E truck is now being applied to pivotal trucks wherever possible. In the design of this casting the lever end is closed so as to provide an oil chamber, access to which is through an opening tapped in the top of the casting. With the lever end closed the threaded brake rod is protected from



Closed Brake-Rod Casting with Provision for Lubrication

dirt, water and snow. Being lubricated, it is safeguarded against rust. These advantages will be readily appreciated by the railway operating men as difficulties due to brake rods rusting tight are prevented and brake adjustments can be made more easily.

Divided Machine Vise

IN ORDER to overcome difficulties from clamping irregular shaped pieces for work on various machine tools, the Coats Machine Tool Company, New York, N. Y., has developed a divided machine vise. It is designed to hold tapered or irregular work in a parallel position and combines adjustability in height with an unlimited span. Through use of a compound parallel and downward movement of the jaws, the work is bedded on its support and eliminates the use of a hammer. The downward thrust of the jaws also permits the clamping of comparatively thin plates, so as to keep them lined up accurately on their packing pieces.

The body and jaws of the vise are made of close grained cast iron and the jaws are faced with hard steel serrated surfaces to insure a good

grip. Screws are of steel and have right and left-hand threads, the left-hand thread running in a solid nut on the moving jaw, and the right-hand thread in the nut which is secured to the body. Each revolution of the screw produces a movement of the jaws equal to twice the pitch of the screw.

The jaws can be used either singly, in pairs, or in threes or fours, where necessary to clamp irregular shapes firmly. They may be placed in an offset position, as is frequently required by the shape of the work. Their main field of usefulness in electric railway shops is on the tables of planing, milling, drilling, shaping and slotting machines.

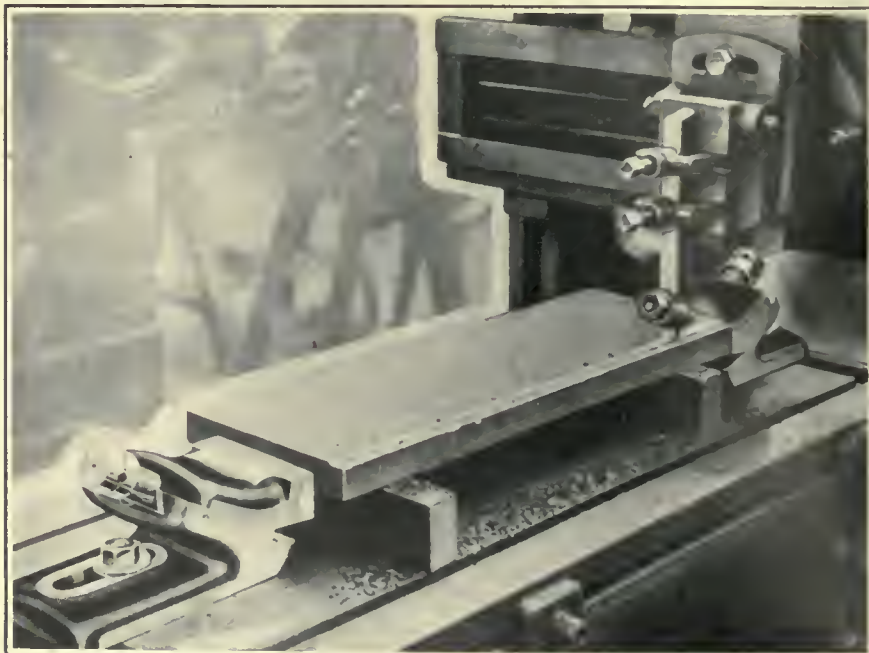
The vises are made in three sizes, with the width of jaw ranging from 2½ in. up to 10 in. and the diameter of the screw from ½ in. to 1½ in. The approximate weights per pair are 6 lb., 40 lb. and 220 lb. respectively, which takes care of all sizes of irregular work.

Controllers for Shop Motors

AMONG the recent developments in control equipment for shop motors are three new types of starters being marketed by the General Electric Company, Schenectady, N. Y. These include an inclosed magnetic switch for starting two and three-phase alternating-current motors and two types of automatic starters for synchronous motors, one for full-voltage starting and the other for reduced-voltage starting.

With the inclosed magnetic switch, overload protection is provided by means of a relay which follows the heating curves of the motor. This switch can be operated by push button, pressure governor, float switch or similar device, and when used as a primary switch the only accessory needed is a drum switch.

Special features of the automatic starter include a temperature overload relay for close protection of the motor from overload, and a definite time relay which determines the accelerating period.



Divided Vise Clamping Work on Planer for Machinlog

Association News & Discussions

Southern Equipment Men Meet in Dallas

Ways to Reduce the Number of Pull-Ins, Car Painting, Education of Mechanical Employees, and Motor Maintenance Were Among the Subjects Discussed

A VARIETY of practical questions was discussed at the seventh semi-annual meeting of the Electric Railway Association of Equipment Men, Southern Properties, held in Dallas Jan. 21, 22 and 23. On the second day a joint meeting was held with the mechanical division of the Southwestern Public Service Association, and on the third day a trip was made to Fort Worth on the invitation of the Northern Texas Traction Company to inspect the shops.

A new system of overhauling cars on a 40,000-mile basis at New Orleans was described by R. M. O'Brien. This plan was outlined in *ELECTRIC RAILWAY JOURNAL* for June 21, 1924. Mr. O'Brien said that it is costing the New Orleans Public Service, Inc., \$75,000 to start the system. In this is included the cost of extra parts, such as extra trucks, extra motors and extra line breakers. These will be changed every 40,000 miles. When cars are brought into the shops for overhauling, other trucks will be ready and other motors, line breakers, etc. The old equipment will be sent to be repaired by the practical railway shopmen and then to be tested by an engineer. The motor going out of the shop will be in as good condition as when first it came from the factory, Mr. O'Brien said. This new system is expected to result in a saving of about \$450,000 per year.

After considerable discussion as to what really constitutes a "pull-in" the following definition was adopted: "A car which has to be removed from service prior to the completion of its regular prescribed run for any mechanical, electrical or man failure or accident will be termed a pull-in."

CAR PAINTING METHODS

Speaking on the subject of car painting, A. Taurman said that the painting of a car being repaired or rebuilt should begin when the parts are being assembled. In the painting of new steel cars, the inspector should pay special attention to the steel before it is assembled to see that it is carefully sandblasted and cleaned free of all dirt and grease, and that the primer is placed on this steel immediately after it has been sandblasted before rust has an opportunity to begin. He should also see that all concealed parts are painted before the steel is assembled.

Similar care should be exercised, Mr. Taurman said, in the assembling of wooden parts. All joints should be carefully white-lead and all surfaces that are covered up or lapped should be given a coat of paint. As a strictly preservative precaution, the painting of

the concealed parts adds more to the life of the car than any other detail of painting. Most painters, however, are prone to pay more attention to the finished and exposed surfaces than to the hidden parts. After all surfaces have been thoroughly primed and all crevices, cracks, nail and screw holes puttied up, the appearance of the finished job will be much better if all uneven parts are sanded off smoothly.

While it is very essential to have the best material possible, too much thought cannot be given to the manner in which the painting is done. The surroundings and temperature of the paint shop are very important items, Mr. Taurman said. The paint shop should be kept warm and as dry as possible at all times. In fact, it is much better to have the cars thoroughly dried out before the painting is begun. Good results can be obtained from a number of the standard painting systems, and enamel has good features, too, Mr. Taurman thought, especially because it saves time. Flat color and varnish, however, are preferred by him because it is possible to use more varnish than with the enamel system.

EDUCATING SHOPMEN

Effective methods of educating the employees in the mechanical department were considered at length. Mr. Taurman said that the best way was to arouse the interest of the men, and to inform them of what the company is trying to do. This makes their work easier and more pleasant. The practice of the Shreveport Railways, according to C. D. Rushing, is to explain to every man his mistakes. This company also urges its employees to read *ELECTRIC RAILWAY JOURNAL* and other publications. If any employee has a good suggestion, the company is glad to try it. Putting a new man with an old man who is familiar with mechanical work is recommended by I. E. Kinser. Ideas along somewhat the same lines were outlined by W. Silvus, C. B. Lane and J. J. Vaughn.

In Fort Worth, the Northern Texas Traction Company has night classes for mechanical men. The I. C. S. course is taught to the employees at classes held two nights a week. If a man finishes his course, he is reimbursed for the cost, according to J. T. Porter, but if he does not finish it, he must stand the expense himself. Advantages of the I. C. S. courses and other vocational training courses were described by H. C. Pressler and W. W. Holden.

Mr. O'Brien stated that he holds a meeting of the foremen once a month.

At this meeting they select some one subject and discuss it. Mr. O'Brien displayed a textbook which is furnished to every man in the mechanical department of the New Orleans Public Service, Inc. The men are allowed to take these books home to study. Good results have been obtained by this means, he said.

Having few pull-ins is a good indication that the equipment is well maintained, in the opinion of Richard Merriweather, vice-president and general manager Dallas Railway, who addressed the meeting. The Dallas Railway has profited by belonging to the Electric Railway Association of Equipment Men, Southern Properties, he said. Records of pull-ins during the past 3 years indicate that this company is progressing, and it is due to the fact of belonging to the association, he believes, because attention was thereby directed to the matter of pull-ins.

Mr. Meriwether also emphasized the importance of educating the shop men. It makes very little difference how good a mechanic the man at the head of the equipment department may be; if he is not an executive and cannot organize his forces and inspire them in a way to get the best work from them, he is a failure. Although he may be the best mechanic in the world, he is worth nothing to his company unless he has ability as an organizer. Work in the mechanical department is likely to get stale unless the interest of the men is maintained. A man working at a bench gets into a rut easily, but education will go far to develop him and push him along, Mr. Meriwether said.

MOTOR VENTILATION STUDIED

Methods of installing exterior ventilators on non-ventilated railway motors were described by Mr. Rushing. His company has installed a ventilator furnished by the Westinghouse Electric & Manufacturing Company on the commutator end of Westinghouse No. 306 motors. Two cars were equipped in this way 5 months ago and a recent inspection showed that the motors were in much better condition than the motors without ventilation. A new shaft is furnished with the commutator end tapered to fit the new housing necessitated by the ventilator. As far as ventilation is concerned Mr. Rushing said that it is entirely satisfactory and the motor is much cleaner inside.

Considerable variation in the period of inspection among the different companies was indicated by the discussion on this subject. The frequency when based on mileage varied from 500 to 2,000 miles. Companies making inspection on a time basis generally do so every 7 days, but a few use 8 or 10 days as the inspection period.

A brush-holder designed by the Westinghouse Electric & Manufacturing

Company to prevent dirt getting in between the brush and the holder in ventilated motors was exhibited by W. C. Looney. He said that by using this brush-holder the Houston Electric Company had increased the mileage from 1,500 to more than 8,000.

The comparative life of armatures as a result of dipping and baking was discussed. Mr. Taurman said that his company got three times as much life out of armatures that had been dipped and baked. F. Wampler said that the Cincinnati, Newport & Covington Railway had been obtaining an average life of 76,000 miles per armature before dipping and baking and that this had been increased to 342,000 miles. M. B. Osborne estimated that this process doubles the life of armatures. Mr. Pressler agreed with this view and W. K. Curtis estimated the increase in efficiency at 20 per cent.

The frequency with which it is necessary to renew motor leads developed considerable divergence of opinion. Estimates of their useful life varied between 4 and 10 years.

At the end of the Thursday afternoon meeting officers were elected for the coming year. The present officials—A. D. McWhorter, president, and A. Taurman, vice-president and secretary-treasurer—were unanimously elected. On the invitation of J. M. Kington it was decided to hold the next meeting of the association in Knoxville, Tenn., on July 22, 23 and 24.

Members present at the meeting were: A. D. McWhorter, A. Taurman, G. D. Rushing, E. D. Wright, Frank Wampler, E. W. Jenkins, F. T. Dawkins, W. Silvus, I. E. Kinser, W. H. Curtis, J. J. Vaughn, R. M. O'Brien, J. M. Kington and J. L. Brown.

L. B. Stillwell to Head Engineering Foundation

AT THE 10th annual meeting of the Engineering Foundation board, held in New York recently, L. B. Stillwell was elected chairman of the Foundation. He succeeds C. F. Rand, who declined re-election after serving for 5 years. E. D. Adams, who has been first vice-chairman since 1915, was re-elected to that office. E. A. Sperry was chosen second vice-president. Other officers named were: Treasurer, J. S. Langthorn; assistant treasurer, H. A. Lardner; director and secretary, A. D. Flinn.

Mr. Stillwell is a past-president of the American Institute of Electrical Engineers and the American Institute of Consulting Engineers. He is a member of the American Society of Civil Engineers, the American Engineering Council, the National Academy of Sciences, the Institution of Electrical Engineers of Great Britain, the Royal Society of Arts of Great Britain, the American Philosophical Society and the Franklin Institute. He is also a trustee of Princeton University and a director of the United States Chamber of Commerce. For several years he was connected with the Westinghouse Electric & Manufacturing Company. Later he was identified with the electrification of the Manhattan Elevated Railway and the rapid transit systems in New York city and elsewhere.

Announcement was made at the same meeting that the four founder societies of civil, mining, mechanical and electrical engineers had begun the study of plans to increase the endowment of the Foundation, established by Ambrose Swasey with a gift of \$500,000, and recently supplemented by a bequest of \$50,000 under the will of Henry R. Towne.

Hoover Sees Progress in Highway Safety Program

REAL progress toward better control of traffic to prevent accidents has been made since the recent conference on highway safety, according to Herbert Hoover, Secretary of Commerce. On this subject Mr. Hoover said:

"Legislation to improve safety on the highways has been introduced into 38 state legislatures since Jan. 1. The various classes of legislation and the number of states in which each class has been introduced can be summed up as follows: Licensing of drivers, 11 states; driving while intoxicated, 17; failure to stop after accident, 6; speed, 12; impounding or confiscation of the car as a penalty for violations of the motor vehicle law, 2, and for transporting liquor or other illegal use, 7; compulsory stopping at railroad crossing, 12 (one legislature is considering a bill to repeal an existing railroad crossing stop law); certification of title, 10; compulsory automobile insurance or bond, 20.

"Recently a law has been introduced in one state legislature amending a law of 1858 with regard to 'the passage of each other by vehicles on the highway,' thus showing that the traffic problem is by no means a new one.

"This legislation, if adopted, will increase to 23 the number of states which require that all drivers of motor vehicles shall be licensed. Fourteen more states will require licenses for drivers of vehicles for hire, while there would remain 11 states without operators' license laws of any kind. Twenty-two states will require some sort of examination before the issuance of license to the applicant.

"In addition to state activities, movements are being started in a large number of cities for carrying out the recommendations of the conference for the co-operative organization of communities for public safety. While many of these cities have had safety programs in the past, these are being revised and an effort is being made to have them conform to the national program as far as local conditions will permit.

"At the present time 12 states have laws requiring the certification and registration of automobile titles, while similar laws are being introduced in the present sessions of the legislatures of four others. The conference designated this class of legislation as 'one of the most important and effective means for reducing thefts, and, by virtue of this result, owing to the relation between the theft and accident hazards, also a measure for improving the present public accident situation.'

Pacific Claim Agents' Association

THE next meeting of the Pacific Claim Agents' Association will be held at the Hotel Biltmore, Los Angeles, Cal., July 22 to July 25, inclusive. This date was set at a meeting of the executive committee of the association, held at the offices of the claims department of the Market Street Railway, San Francisco, on Feb. 14. A tentative list of subjects follows:

"Will Periodical Physical and Mental Examinations of Trainmen Reduce Accidents? How Often Should These Examinations Take Place and What Should Be the Scope of Such Examinations?"

"Methods of Facilitating Vehicular Traffic in Cities."

"The Advantages and Disadvantages of Presenting Claims Against Automobile Owners and Others Responsible for Damage to Company Property."

"Perfecting Plans for Reference so that the Claims Department in an Emergency Can Be Readily Enlarged to Meet Any Catastrophe that May Arise on Company Property."

"Training of Men for Positions as Investigators and Adjusters."

American Association News

A. E. R. A. in New Quarters

NEW OFFICES are now being occupied by the American Electric Railway Association. They are in the Johns-Manville Building, 292 Madison Avenue, New York, at the southwest corner of East 41st Street. The move from the former quarters at 8 West 40th Street was made over the holiday which included Feb. 23. The change was made with great celerity.

The space now occupied comprises the whole 14th floor. The quarters are plainly but comfortably and efficiently furnished and arranged. Partitions, the upper half of which are glass, separate the various offices. The lighting system is semi-direct. As for the building itself, it is about 5 minutes walk from the Grand Central Terminal, 3 minutes from the subway system and surface lines, and close to the Engineers' Club and the Transportation Club.

More than 2 years ago the former office space became overcrowded, and the association took over two additional rooms on the same floor. The volume of work continued to increase, and a year ago additional space was taken on the fifth floor of the building. This arrangement was not satisfactory since it separated the Bureau of Information and Service from the rest of the headquarters, but it was the best that could be done at the time.

L. S. Storrs, the new managing director of the association, will have his headquarters in the Johns-Manville Building, but their location has not been definitely determined. His suite, however, will probably be on the 12th floor of the building, the one immediately below the floor now occupied by the other officers of the association. There is no 13th floor.

The News of the Industry

Home Rule for Buses Up Again in Ohio

The hearing before the Public Utilities Commission of Ohio on the applications of the People's Motor Bus Company and the Cleveland Railway for operating rights in Cleveland, scheduled for Feb. 11, was postponed indefinitely to give the State Legislature, now in session, a chance to consider amendments that have been proposed to the existing law under which the operation of buses is regulated. One of these amendments will take control of motor bus transportation in cities and in municipalities contiguous thereto from the State Public Utilities Commission and place it in the hands of the local governments. A bill to do this has already passed the State Senate, and lacked but one vote of passing the House on Feb. 19. On reconsideration the measure was to come up again during the week ended Feb. 28.

Unlawful for City to Pass Ordinance Against One-Man Cars

Judge Isaac Wolf in the Superior Court at New Haven, Conn., recently granted a permanent injunction restraining the city of New Haven from interfering with the operation of the one-man double-truck trolley cars used by the Connecticut Company in that city. In handing down his decision Judge Wolf made it plain that the issue did not involve whether the ordinance in question should be adopted and enforced upon the ground of public convenience and safety, but merely whether the city by provisions of its charter is vested with power to pass such an ordinance. The city protested the operation of the one-man double-truck trolleys with "An ordinance to prevent accidents, facilitate traffic and preserve good order in the streets of the city and highway districts and to secure the safety of persons using said streets."

No Abandonment on Five Lines in Buffalo

The Public Service Commission issued an order directing the International Railway not to abandon service on Feb. 22 on five of its local lines in Buffalo as had been threatened. In a conference with members of the Public Service Commission in New York city 48 hours prior to the time the abandonment order was to go into effect Coleman Joyce, chief counsel for Mitten Management, Inc., although consenting to withdraw the order, said that no court or commission could force the company to undertake the operation of a non-paying enterprise and that the International Railway has been operating its system at an annual loss of

\$660,000. The commission, however, issued a mandatory order directing continued operation of the five lines which were scheduled for abandonment. One-man cars were placed in operation on Feb. 22 on three additional lines in Buffalo—Niagara Street, Broadway and Elmwood Avenue. These are three of the heaviest patronized lines in the city. The economy program was announced by the company in a brief statement to car riders. There is now pending before the Public Service Commission an application

of the company for a higher rate of fare and a similar action is pending whereby the city seeks to have the fare reduced to 5 cents. The present fare is 7 cents or four tokens for 25 cents. A rate of 8 cents cash with two tickets for 15 cents has been suggested. The International Railway is considering the abandonment of the Main Street car line in the city of Niagara Falls and has asked for a 7-cent fare or four tokens for 25 cents in that city. The company now charges a 5-cent fare in Niagara Falls.

Bus Report Presented in New York

Transportation Board Makes Suggestions for Guidance of City—Routes for Private Operation Recommended—Many Railway Companies Seek Operating Rights

THE Board of Transportation of New York City filed with the Board of Estimate and Apportionment on Feb. 20 its second report on the pending petitions for omnibus franchises in the city of New York. The report deals with 80 applications by 52 corporations or individuals, many of them local railway companies, for franchises to operate 113 routes.

The report was made in response to a resolution of the Board of Estimate on Nov. 3, 1924, requesting the Board of Transportation to conduct a further examination and investigation of all applications for omnibus lines in the five boroughs and to embrace in the report information which the Board of Transportation deemed should be in possession of the Board of Estimate for its guidance in considering omnibus franchise applications.

If the right of the city to own and operate omnibus lines is upheld a series of routes and lines that may properly be established in all the boroughs is laid out and recommended in the report. If the right of the city to engage in municipal operation of omnibus lines is denied, it is recommended that a grant, either in the form of a permit or a franchise, be made to petitioners desirous of providing such operation. In this event, the board believes a definite plan of routes and franchise conditions should be considered so that all those seeking franchises may have a standard form of application and the Board of Estimate have for its consideration proposals that are comparative and competitive.

The report points out that if the city cannot undertake municipal omnibus operation the Board of Estimate could tentatively, at least, approve the routes and the form of proposed franchise and invite applications which would be uniform.

As a basis for standard proposals for franchise grants the board recommends that the following factors be adhered to:

- (a) Duration of franchise.
- (b) Fare to be charged and transfer conditions.
- (c) Compensation to be paid to the city for the franchise.
- (d) Service or headway to be offered at the beginning of operation.
- (e) Type of vehicle to be employed.

In its treatment of the question of fares the report states:

Most of the petitioners for omnibus franchises express willingness to operate and maintain service for a 5-cent fare. Some offer to grant transfers for that fare without extra charge for transfer, and others stipulate that a charge shall be permitted for transfers. Others of the petitioners, including some of the surface railroad corporations and the corporation that now operates a comprehensive omnibus system in Manhattan under perpetual franchise and temporary permits for a 10-cent fare, demand a 10-cent fare for longitudinal or trunk line service, with a 5-cent fare for cross-town or short route service. Those corporations that offer service for 5 cents are for the most part newly created, and some of them are not at present in the transportation field. There is no present reason, however, to question their financial ability to carry out the proposals submitted.

Records of omnibus operation in this city and elsewhere show that such operation is being maintained over certain routes for a 5-cent fare. On some routes the return for a 5-cent fare may be inadequate because of light patronage or length of haul, but for a system embracing both short and long haul traffic several of the petitioners state that they are prepared to operate for a 5-cent fare.

The report indicates that the estimated initial cost of equipping and housing 1,259 buses will be approximately \$11,000,000, of which \$3,000,000 will be for garages. The estimates for bus equipment are:

	Buses	Cost
Manhattan	439	\$3,130,900
Brooklyn	73	497,100
Brooklyn	422	2,748,000
Queens	325	2,112,500
	1,259	\$8,488,500

In dealing with the cost of operation the report says:

From most carefully compiled statistics it would thus appear that in order to meet all necessary expenses on the basis of a 5-cent fare eight or more passengers per mile must be carried, or "picked up," for double-deck service and six or more passengers per mile for single-deck service.

Forty of the 52 corporations or individuals that have petitioned for bus franchises seek to obtain grants for single routes or for from two to six routes. These applications are classified as miscellaneous largely for the reason that in many cases the routes are disconnected or that generally no comprehensive system of bus transportation is indicated by the applications.

Among the applicants for bus routes to be operated in conjunction with existing rapid transit lines are the Brooklyn-Manhattan Transit Corporation, the New York Railways and the Staten Island Rapid Transit Railway.

The application of the New York Railways discloses that the company proposes to abandon 20 miles of trolley lines and substitute 40 miles of bus routes. The railway officials suggest payment of \$5,857,577 out of omnibus earnings in return for discontinuance of surface railway property that cost originally \$7,857,405. Part of the surface railroad track proposed to be paid for under this amortization scheme has been unused and practically abandoned for some time past. It is estimated by the company that the salvage that will accrue to it from sale of this scrapped surface railroad property will be 5 per cent of original cost. Franchise rights are asked for practically 100 per cent more mileage for omnibus service than it is proposed to discontinue as surface railroads.

While a 5-cent fare can only be charged for railroad operation, a 10-cent fare is proposed for longitudinal or trunk lines of omnibuses. The only free transfer proposed in connection with omnibus service is from 10 cent lines to 5 cent lines.

The Interborough Rapid Transit has not filed formal application for a bus franchise, but the company has expressed a desire to operate crosstown or other feeder lines as may be agreed upon for a 3-cent fare. The Third Avenue Railway, operating in Manhattan and the Bronx, has also signified its willingness to run buses.

Express Bus Service Between Fairmont and Morgantown

De luxe express bus service between Fairmont and Morgantown, W. Va., is being planned by the Monongahela-West Penn Public Service Company as an added feature to its Morgantown-Rivesville service. If the State Road Commission concurs in the arrangement, the service will be started in about 6 weeks.

A modern Fageol bus of 25-passenger capacity has been purchased and the contemplated schedule provides for four or more round trips each day with running time between the two cities 1 hour and 15 minutes.

Bus Lines Will Supplement Railway in Minneapolis

Although it has been ruled that a proposed ordinance granting the Minneapolis Street Railway, Minneapolis, Minn., an exclusive franchise to supplement its trolley system with bus

lines will require a special enabling act from the Minnesota Legislature the city attorney holds that by agreement Council may require the company to establish certain bus lines. The company now is operating buses between the Twin Cities and between St. Paul and Stillwater, Minn., a suburb.

The railway expects to spend \$500,000 for bus equipment after the ordinance is passed, in addition to buses already planned to fit ordinances already effective and those now in service in north Minneapolis. A garage will cost \$100,000 additional. Universal transfers will be given, but the bus fare will be higher than the car fare, which is 6 cents.

Chicago Mayor Wins

Prospects for \$600,000,000 Traction Program Believed to Be Enhanced by Election on Feb. 24

Mayor Dever and Samuel Insull have agreed on \$85,000,000 as the price to be paid by the city for the Chicago elevated lines. The conclusion of the deal was announced on Feb. 25, after 8 months of dickering. The compromise was reached the day after the forces aligned behind Mayor Dever had succeeded in electing an outright majority of the City Council to back up his \$600,000,000 traction ordinance. This measure called for the construction of elevated lines by the city in the event that a deal with Mr. Insull could not be arranged. The city yielded several points in the ordinance and the redraft was at once submitted to the Council for passage.

The outstanding feature of the election on Feb. 24 was the decisive approval of the policies of Mayor Dever as reflected in the results at the polls. Mr. Insull's attitude is that so urgent is the necessity for an adequate transportation plan that he cares not what the scheme may be that is proposed, provided it embodies a co-ordination of the local transportation facilities and the development of rapid transit in the largest sense of the word.

Hostility of the old ring of Chicago politicians who ran on a "5-cent fare" platform in the days of William Hale Thompson has taken a new turn in relation to the \$600,000,000 Chicago traction ordinance. Governor Small has entered the arena with an order to the Illinois Commerce Commission to make a thorough investigation of the ordinance before it comes to referendum. He is also having a traction bill drafted for the Legislature.

Small acted at the behest of Fred Lundin, who "made" Thompson and had to retire from politics when the notorious Chicago graft trials broke Thompson's grip on the machine. Thompson and Lundin split. The latter now seeks to take away the foundation for Thompson's 1927 mayoralty candidacy by stealing the transportation issue.

The bill which Small is having drawn is likely to provide for the creation of a "transportation district," a tax-assessing government functioning similarly to school governments. Thompson once sponsored such a plan, but

Lundin now says he was the author of it. The price of political preference is again being expressed in terms of patronage.

Rockford Mayor Awards Franchise to New Company

The city traction problem in Rockford, Ill., became acute recently when Mayor J. Herman Hallstrom cast the deciding vote awarding the railway franchise to the Rockford Public Service Company, headed by T. M. Ellis, Jr., in opposition to the Rockford City Traction Company, now operating in the city. The Council was divided eight and eight on the two franchises submitted. Final action is dependent upon a referendum at the city election on April 7.

Prior to the Council's action the Rockford City Traction Company ran a series of advertisements addressed to the public and Council in which it set forth its side of the case.

The City Traction Company for 2 years has been operating under a temporary franchise, but has been negotiating for a franchise ordinance embodying railway and bus services, and had apparently come to an agreement on terms when Mr. Ellis came forward with his offer. The Rockford City Traction Company does not consider the problem settled. W. C. Sparks, manager; F. W. Walker, representative of the bondholders, and Judge R. K. Welch, attorney for the company, issued a statement expressing surprise at the hasty action of the Council "without giving all parties interested a chance to be heard and which, if it prevails, works a gross injustice on those who now have their money invested in this property." The various steps in the Rockford controversy have been followed in the ELECTRIC RAILWAY JOURNAL.

Insurance Measure Dead in New York

Compulsory insurance for all motor vehicle owners is dead at Albany for this year at least, in the opinion of Lewis G. Stapley, chairman of the motor vehicle committee of the Assembly and chairman of the joint legislative committee on motor vehicle legislation, who presided at the hearing at Albany on Feb. 24 on the various motor vehicle bills before the Legislature.

The New York State Auto Bus Association, however, through James J. Dadd of Rochester, its secretary-treasurer, has recommended the amendment of section 282-b of the highway law, so that all motor bus concerns carrying passengers for hire would be subject to the provisions. At the present time the law excepts corporations. While the Public Service Commission is requiring liability insurance as a stipulation to the certificate of convenience and necessity this ruling is not retroactive as to old corporations. The Bus Association feels that what is fair for one is fair for another and that it is unfair to except a bus owner because he is a corporation. An amendment to the law covering this feature is expected to be introduced at an early date.

Passage of Moorhead Bus Bill Awaited

The Moorhead bus regulation bill was advanced another step toward passage in the Indiana Senate on Feb. 9. The bill would place commercial motor vehicles under the regulation of the Public Service Commission. Bus interests want their vehicles under the direction of the State Highway Commission.

The Moorhead bill was amended so as to exclude private truck owners. Another amendment made provision for continuance of city bus lines under the control of city boards where already so established. The third amendment was to the clause taking care of existing bus companies in the matter of issuing certificates of convenience and necessity. It made that clause refer to bus lines that were in existence ninety days prior to the taking effect of the act instead of ninety days prior to Jan. 1, this year. The fourth amendment struck out the emergency clause. This will delay the enforcement of the act, if it is passed, until the proceedings of this Legislature are published, which will be some time in May. With the emergency clause attached, the bill would be in effect immediately after the Governor appended his signature.

Goldsboro to Have Buses

The Board of Aldermen of Goldsboro, N. C., recently granted an exclusive franchise to H. G. Bales, for the operation of buses beginning March 1, 1925, for a period of 10 years. Mr. Bales is president of the Highway Motor Transit Company, a concern operating buses between Goldsboro and Warsaw. Transportation will now be available to the residents of Goldsboro, who have been denied service since the Goldsboro Electric Street Railway abandoned service a few years ago.

A recent statement from the city said that the Goldsboro Electric Street Railway was no longer in existence since the city took over its holdings; that the property was now in charge of C. W. Grantham as city manager, and that the greater portion of the trackage and equipment had been dismantled. Further, it was the purpose of the city to dispose of all the equipment. The new proposed operation will consist of not less than three buses of the street car type with a passenger carrying capacity of between 20 and 27 passengers. Mr. Bales said he could loop the city with five buses run on regular schedule. The rate of fare will be 10 cents, but books of 20 tickets will be sold to school children for \$1. It is said that the original investment requires \$50,000.

Albany Company Seeks 10-Cent Fare

The United Traction Company, operating in the cities of Albany, Troy, Cohoes, Watervliet and Rensselaer, N. Y., filed a petition with the Public Service Commission on Feb. 21 asking for an increase in its fares from 7 to 10 cents, effective on short notice. The 7-cent fare was fixed by order of the commission on July 5, 1922.

The petition of the company declares that the fair value of the railway now exceeds the sum of \$15,000,000 and that the revenues have not been sufficient to meet the costs. A table submitted shows for 1922, from June 30, a total railway operating revenue of \$1,524,814 and operating expenses and taxes of \$1,461,939, leaving net operating revenue of \$52,875; 1923, operating revenue, \$3,234,149, operating expense, \$3,084,437, with net revenue of \$149,711; 1924, operating revenue, \$3,205,856, operating expense, \$3,076,247, with net revenue of \$129,608, all before the payment of fixed charges and taxes.

More Bus Rights Sought in Rochester

Independent bus owners of Rochester, represented by James J. Dadd, secretary of the New York State Auto Bus Association, have petitioned the City Council for permission to operate a belt bus line over 30 streets in the city of Rochester. The proposed line will cross thirteen of the local lines of the New York State Railways, but only in a few minor instances will it parallel the railway routes. It is planned to operate with six sedan type buses.

Rochester now has virtually no cross-town lines and the proposed route circling the city would connect with all parks, golf links, etc. Its backers profess themselves willing to furnish transfer privileges with the railway.

As has been explained previously, the New York State Railways has petitioned to run buses over the Ridge Road, a route now served by Buckley & Buckley, operating under the name of the Ridge Road Bus Lines. Officials of the state bus men's association opposed this plea at public hearings. Following announcement that the Manitou railway line would suspend operation, the New York State Railways proposed to establish a network of bus lines along the lake shore serving towns along the railway. The independent owners, headed by Mr. Dadd, now propose to operate buses from Nine Mile Point to Manitou, serving virtually the same route. They have petitioned the town boards along the line for operating rights.

The Council has referred the belt line petition of the independents to a committee. Council members, it is said, are loath to authorize any competition with the New York State Railways, which operates in Rochester under the service-at-cost contract and for 4 years straight has failed to make its guaranteed return.

Expansion of the bus system of the railways is looked for as the outcome of the rivalry. Purchase of the Buckley line by the traction interests is regarded as another possibility.

Canadian Government Suggests Electrification.—Electrification of railroad lines in Quebec Province is forecast by Premier Taschereau, who recently suggested such a plan and promised that if railway companies adopted the proposal the province would do all in its power to assist. Abitibi Southern, which is now obtaining its charter, is the first road to indicate it would take advantage of government suggestion.

Question of Paving Responsibility Considered

The New York Transit Commission reserved decision on Feb. 24 on the question whether the New York Railways in its reorganization should be permitted to abandon lines on which service has been discontinued and thus probably escape responsibility for its share of the cost of repaving and resurfacing the streets when the tracks are torn up. The cost to the company, if it is held responsible, is estimated at about \$500,000.

The matter came before the Transit Commission at a hearing on the form of deed of sale of the company's properties, which were sold in foreclosure proceedings last summer. In this deed from the New York Railways to the New York Railways Corporation, as the reorganized company will be known, there has been omitted the Delancey and Spring Streets lines and parts of the Avenue C, Madison Street and Sixth Avenue lines, service on which was discontinued soon after the late Job E. Hedges was appointed receiver. Under the law, a receiver can discontinue service on an unprofitable line but cannot surrender the franchise, as such action can only be taken by the directors of a solvent company.

Assistant Corporation Counsel Edgar J. Kohler objected to approval of the deed without the inclusion of the discontinued lines. Mr. Kohler said that the Manhattan Surface Coach Company, which he said was a subsidiary of the New York Railways, had applied for bus franchises on the streets occupied by the discontinued lines and contended that the company wanted the city to stand the entire expense of resurfacing the streets and then permit its subsidiary to operate buses upon them.

George H. Stover, assistant counsel of the commission, also opposed the approval of the deed without inclusion of the discontinued lines. Joseph P. Cotton, counsel for the company's reorganization committee, advocated approval of the deed, as did Hugh J. Sheeran, the present receiver.

Madison Company Adopts Bus as Auxiliary

The Madison Railways, Madison, Wis., will begin on March 1 the operation of a bus line from the Capitol square to the residential district of Nakoma. This will be its first experience in the operation of buses as an auxiliary. Dudley Montgomery, vice-president of the railway, announced that three street car type buses, seating 29 passengers, would be purchased from the Yellow Coach Manufacturing Company, Chicago. The proposed schedule provides for 25 trips each way daily. It is believed that as traffic warrants bus lines will be established in other parts of the city.

Some time ago the Wingra Bus Company, Madison, applied to the Common Council for an exclusive franchise to operate buses in the city. With the proposed activity in the bus field by the railway it is generally thought that this application will not be favorably acted upon.

News Notes

Fare Increase Deferred.—The Cleveland Railway, Cleveland, Ohio, has postponed the raising of car fares from 5 to 6 cents in Lakewood, a suburb, in accordance with a recent agreement with that city. This action was taken by the railway in view of the attitude of the City Council of Cleveland in refusing to approve the change, even for a year.

Considers Improved Service in Remote Sections.—The City Council of Portland, Ore., in a public hearing, recently discussed the problem of improving railway service in remote sections of the city, especially in the St. Johns district. F. I. Fuller, vice-president of the Portland Electric Power Company, stated that his company was willing to co-operate in any way that would give the patrons of the district the best service. He called attention to the fact that last year 4,500,000 passengers were carried on the line, with receipts of more than \$250,000. The report of Commissioner Mann on proposed improvements was heard. Mr. Fuller stated that the improvements suggested in the report would cost more than \$250,000, but believed the service should be given.

Must Explain Platform Extension Neglect.—The Chicago Rapid Transit Company, operating the elevated lines in Chicago, has been cited by the Illinois Commerce Commission to explain the failure to lengthen the elevated platforms in the loop district as authorized by the commission. The company has an application pending with the city for permission to extend the platforms, but action has been delayed for the last 6 months pending negotiations between Samuel Insull and Mayor Dever over the purchase of the elevated lines. The city has final jurisdiction.

Bus Operator Protests Grant to Railway.—The Columbus & Marysville Bus Company, Columbus, Ohio, has filed a protest with the State Utilities Commission against granting the Columbus, Urbana & Western Electric Railway a certificate to operate a bus line over Riverside Drive from Fishinger's Bridge, 8 miles north of Columbus, to the center of the city. The protestant claims that residents in the community north of Columbus have easy access to the city on its buses, also on city street cars and on Columbus, Urbana and Western interurban cars. There is not enough business for two bus lines, the complaint says.

Traction Solves Puzzle.—There will be no more unmerciful chewing of innocent lead pencils over a lost word on the de luxe trains of the Illinois Traction System. Cross-word puzzle dictionaries have been installed in the parlor car coaches of the Capitol Limited, the de luxe train running between St. Louis and Peoria. The sleeping car Illini, from St. Louis, Decatur and Champaign, which has reading tables, will also be equipped. The old faithful game of "rummie" is becoming

a lost art among railway passengers. Every one is working cross-word puzzles, so the company is supplying dictionaries to solve its patrons' puzzles.

Bus Service Grows.—Another Pierce-Arrow de luxe passenger coach has been placed in service on the Niagara Falls - Lewiston - Queenstown route of the Gray Bus Line of Niagara Falls. This is the second of these buses placed in service over the Niagara Scenic Highway since the Niagara Falls Power Company took over the Niagara Gorge Railway, which controlled the Gray Bus Line. The company's buses are painted a very light shade of gray with vermilion trim.

Use the Trolley and Save Money.—The fact that the price of gasoline has increased in Detroit more than 44 per cent since the first of the year is pointed out by officials of the Detroit Department of Street Railways in placards on all municipal cars which carry the sign "Gas up 44 per cent; save by trolley." With the price increases put into effect by the gasoline producers and the 2-cent gasoline tax, which recently went into effect in the state when the bill was signed by Governor Groesbeck, D. S. R. officials have used the placard to advise motorists to save by using the trolley cars for city riding and leaving their automobiles at home.

Substitution of Municipal Buses for Private Ones Approved.—Plans for the operation of buses by the Seattle Municipal Railway on Tenth Avenue Northeast and branch lines in the University district have been approved by D. W. Henderson, superintendent of railways, who expresses the belief that the buses in time would yield a profit. The buses will replace those now being operated by a private concern. Under the present private operation patrons of the buses pay 10 cents cash fare with transfer, the city receiving 2½ cents of this amount. If the city takes over the buses the fare will be reduced to 8½ cents, with transfer privilege to the street cars.

Three-Cents-a-Mile Tickets Valid.—The Public Service Commission has approved a new regulation of the Buffalo & Erie Railway, Buffalo, N. Y., providing for the sale at all ticket offices of the company of books, each containing two one-way tickets, valid for transportation of persons presenting ticket between points named on ticket, at 3 cents per mile per trip. No ticket will be sold for a distance of less than 5 miles. This ruling became effective Feb. 20.

Contract Approved.—An application filed with the Public Service Commission by the Philadelphia Rapid Transit Company, Philadelphia, Pa., for approval of a contract with the Township of Upper Providence was considered recently. A representative of the transit company, lessee of the Darby, Medina & Chester Street Railway, explained that by payment of \$13,000 the transit company was relieved of all liability with respect to the paving and maintenance of the streets in the township occupied by railway tracks. There was no protest and the matter was referred to the entire commission.

Course in Public Utilities Offered.—A new course in public utilities will be offered in the Indiana University in Indianapolis in the spring semester. The course, under the supervision of Marvyn Crobaugh, will include the history, development and present status of the industry. Besides the regular course of study there will be a series of lectures by public men familiar with public utility problems. The speakers include Martin J. Insull, Middle West Utilities Company, Chicago; Arthur W. Brady, Union Traction Company of Anderson; Dean Heilman of Northwestern University, and prominent engineers and public service commissioners.

Motorman Absolved in Accident Case.—Although held responsible by the Interstate Commerce Commission for the rear-end collision between two trains on the Buffalo-Niagara Falls high-speed division of the International Railway on Oct. 19, when many excursionists were injured, Howard Foreman, motorman of the second section, was absolved from all blame by Coroner J. E. Helwig of Tonawanda. Failure of the equipment of the car to function properly was given as the cause of the accident by the coroner.

Resolution Praises Retired President.—Charles L. Kurtz, whose resignation as president of the Columbus Railway, Power & Light Company, Columbus, Ohio, was recently referred to in the ELECTRIC RAILWAY JOURNAL, will be presented with an engrossed copy of a resolution passed by stockholders and directors of the company which expresses their appreciation of the manner in which he conducted the business of the company during his presidency. The resolution regretted the loss of his advice and interest and assured Mr. Kurtz of the well wishes of his former associates in the years to come.

Accident on Pennsylvania at Newark.—Three persons were killed and thirty-two others were injured, several seriously, when a Philadelphia local train on the Pennsylvania Railroad rammed into the rear of an Atlantic Coast Line express standing at the platform of Manhattan Transfer early on Feb. 24 on the New Jersey Meadows. The accident occurred on the electric division of the road.

Use of Tokens Extended.—The North Carolina Public Service Company is now using tokens on all of its cars in Salisbury instead of cardboard tickets. They are being sold at the same price that has prevailed for tickets, 7 cents each or four for 25 cents. Tokens have been used by the company in Greensboro for some time.

All-Night Service Unprofitable.—Operation of all-night service over the Stark Electric Railroad between Alliance and Canton, Ohio, is a losing venture, according to company officials. The service was started several months ago to accommodate railroaders who live in Alliance and report for work at the company shops near Canton. A contract between the Stark Electric Railroad and the Pennsylvania Railroad which resulted in establishing the all-night service expired Jan. 1. Railroad officials have made no move to renew the agreement.

Buses Replace Cars.—Word has been received from Leavenworth, Kan., that all local trolley service has been suspended and five Mack 25-passenger buses are now providing the local transportation facilities. Last December the Kansas City, Leavenworth & Western Railway applied for and was granted permission to abandon street car service in Leavenworth and substitute bus service in its stead, to operate over the two routes formerly covered by the trolleys. The traction company formed a separate bus operating company known as the Leavenworth Transportation Company, which placed buses in service recently. The two routes, which are between 3 and 4 miles in length, are now being covered by the buses, operating on an 8-cent fare.

Action Prohibiting Bus Operation Restrained.—A writ restraining the county courts from taking action in the case of the Union Traction Company, Anderson, Ind., against Donald Lake and others, involving their right to operate buses in Muncie, Ind., has been issued by the Indiana Supreme Court. The case has been pending in the courts for some time.

Widow Wins Case.—A verdict of \$10,000 was recently awarded to Mrs. Eva Chrampanis for the killing of her husband by a trackless trolley operated by the city of New York on Staten Island in March, 1923. The corporation counsel interposed the defense that as the city was operating illegally it was not answerable in damages. When Justice Strong had sustained the city's defense the attorney for Mrs. Chrampanis countered this move by amending the complaint so as to join Mayor Hylan and the members of the Board of Estimate and Apportionment individually as defendants. A jury before Supreme Court Justice May in Staten Island on Feb. 18 decided that the city was answerable to the widow and children.

Fare Boxes in Little Rock.—The Arkansas Central Power Company recently adopted the system of fare boxes on its cars in Little Rock, Ark. To help passengers have the exact fare ready a 6-cent token or metal ticket has been provided.

Wants Enforcement of Paving Ordinance Restrained.—Suit has been filed in the Federal court in Indianapolis, Ind., by the Terre Haute, Indianapolis & Eastern Traction Company against the city of Newcastle, John H. Morris, Mayor, and Robert S. Hunter, city attorney, asking an injunction restraining the enforcement of a city ordinance which would require the company to lay new tracks and pave a part of a street in Newcastle. The complaint alleged that the ordinance is in violation of the Federal constitution in that it deprives the plaintiff of its property without due process of law and is contrary to a contract held by the company with the State of Indiana.

Both Companies Secure Permits.—The Board of Public Service of St. Louis, Mo., following a public hearing, decided to issue permits for a bus line on West Florissant Avenue to both the People's Motor Bus Company and the St. Louis Bus Company, an auxiliary of the United Railways.

Foreign News

Auckland Uncertain About Buses

The City Council of Auckland, New Zealand, is adding to its bus equipment, but believes that "tramways remain supreme for mass transportation of dense communities of the cities." The tramway system in Auckland was taken over by the city in 1919 and serves a population of 170,000. To carry this traffic 186 cars are used and these operate over 30.35 miles of route. Though a municipal enterprise jitney buses were allowed to run, and these, with the great increase in private automobiles, have caused a strain on the finances of the tramway system.

The Council decided to put the matter before the public, and late last year published a statement giving an official review of its tramway policy. In this review the Council expresses its belief that no other vehicle can adequately or satisfactorily replace the tramway cars, so far as regards the transportation needs of 90 per cent of the community. The question, it says, is whether it is proper to allow the tramway service to be impaired by senseless competition because of the habits of the remaining 10 per cent of the population. Buses alone are inadequate to serve the situation.

The city has decided to expand its bus service. Last fall it had 10 on order and it has decided to order 20 more to take the place of any further track extensions, for the present, though 10 additional cars are to be added for the 1925 season.

Traffic Congestion a Problem in Glasgow

A traffic survey for the relief of street congestion was suggested to the members of the Glasgow Town Council, Scotland, at the annual inspection of the tramways undertakings. Referring to the suggestion to eliminate all tramways from the central area of Glasgow, ex-Bailie Laing said that instead of more than 1,000 tramcars, it would take between 2,000 and 3,000 buses to transport the people into the center of the city, and if the tramways were barred congestion would be increased. He urged the adoption of one-way streets and utilization of certain roads for fast traffic. He also suggested that the railway companies provide an electric shuttle service between the city and suburban areas.

Fares Cut on London Buses

A drastic reduction in fares was put into effect on Dec. 3 by the Association of London Omnibus Proprietors, under which so-called pirates are run. The cuts amount to approximately one-third of the previous fares.

The object of these cuts, according to A. Kemp-Gee, managing director of the Cambrian Company, is to meet the competition of the London General Omnibus Company, following its introduction of combined bus, tram and tube

tickets, and combined season tickets. This competition has been further accentuated by the opening of the new section of the City & South London Railway. Mr. Kemp-Gee said in an interview that while his company could not offer similar facilities to its patrons, it could reduce fares to a point even below the monthly or quarterly season ticket rate.

It is understood that the London General Omnibus Company does not intend to take any action at present, but will proceed with its plans to offer the public a co-ordinated traffic service along the lines already outlined.

Operations Show £63,598 Balance.

The accounts of the Cape Electric Tramways, South Africa, for the year to June 30, 1924, show a profit of £81,535, and after providing for debenture interest, redemption of debentures and taking into account balance brought forward a net credit of £63,598 remains. The reserve fund has been credited with £20,000, leaving £43,598. The directors recommend a final dividend of 3 per cent, making 6 per cent, free of tax, for the year, carrying forward £14,125. During the year the tramways carried 31,794,150 passengers, with gross receipts of £398,896, as against 32,094,580 passengers, with gross receipts of £408,753, in 1922-23. Although a falling off of slightly under 2½ per cent has been experienced in traffic receipts, there is a corresponding reduction under various headings of expenditure; the net result, therefore, comes out practically the same as last year.

Franchise of Paris Transports en Commun to Be Revised.—The question of the revision of the Transports en Commun franchise was discussed at a recent meeting of the Council General of the Seine. An agreement that will be acceptable to both parties is being sought. The final proposition is that the Transports en Commun shall renounce its remuneration of one-fourth of 1 per cent on receipts exceeding 250,000,000 francs, the bonus on economies exceeding 0.85 of 1 per cent of the receipts, a quarter of the bonus running from 0.85 to 0.95 of 1 per cent, half of the bonus between 0.90 and 0.95 and three-fourths of the bonus exceeding 0.95 of 1 per cent of the receipts. The economies resulting for the Department of the Seine by this new agreement are expected to amount to approximately 500,000 francs during 1925. The franchise now in effect was outlined previously in these columns.

Japanese Electric Railway Plans Changed.—The franchise right for construction of underground railways in Tokyo, Japan, has been canceled by the Tokyo government. The franchise was formerly held by the Musashi Electric Railway. This company has been reorganized as the Tokyo-Yokohama Electric Railway and proposes to build a suburban railway from Tokyo to Yokohama.

Financial and Corporate

\$3,000,000 Philadelphia Stock Issue

Passenger Partnership Campaign
Started by Mitten Management
to Secure Additional Funds

Users of the service of the Philadelphia Rapid Transit Company, Philadelphia, Pa., are being afforded an opportunity to become stockholders of that company under a new plan which makes investment easy. It is explained that the issue which the car riders are to be permitted to buy is to consist of \$3,000,000 of preferred stock paying a 7 per cent cumulative dividend. It is to be split up into 60,000 shares with a par value of \$50 each. Passengers are to be permitted to apply for from one to ten shares. The proceeds from the sale of the stock will be used to finance extensions and additions to property and to retire or acquire prior obligations. It is explained that the earnings applicable to the preferred dividends for 1925 appear to be more than 15 times the sum necessary to pay them. In this connection the company says that "conservative bankers consider a preferred stock a good investment where the dividend is earned only three times."

After the stock has been allotted purchasers will be permitted to pay for it in full in cash or at the rate of \$1 per share per month. The partial payment plan is intended to make it easy for men and women who desire to save as they go to become part owners in the property. P. R. T. employees asked the right to buy the preferred stock, but they have agreed to wait until the car riders have had the first opportunity to buy.

Men and management at Philadelphia together now own more than one-third of the common stock of the company, through which ownership they may subscribe to more than one-third of the preferred stock. They have waived this right so that more than \$1,000,000 of the new preferred stock will be available for sale to the car riders as soon as it has been authorized and issued. All other stockholders will be asked to give up their rights of subscription so that all of the \$3,000,000 issue may be sold to the car riders.

As to the partial payment plan, the payments will be due each Saturday, but it is explained that they can be made on any week day or for as many weeks in advance as desired. Should any payment become 5 days overdue all money paid in up to that time will be returned and the stock will be sold to another purchaser. Receipts will be issued for each payment and when \$50 per share has been paid the stock certificates will become the property of the purchaser or subscriber.

It is intended to pay dividends of \$1.75 per share every six months. The stock will be redeemable at \$55 per share. Application will be made to list

the stock on the New York and Philadelphia exchanges so that a ready market will be available for the issue at all times.

Another Property Passes to Mr. Insull

Samuel Insull, Chicago, and interests represented by him have arranged to purchase the entire system of the Indiana Service Corporation, including both the local city lines in Fort Wayne, Ind., and the three interurban systems operated by the local company. Formal transfer of the company has not yet

been completed, but according to an announcement made on Feb. 20, all the details of the transaction were completed some time ago. Robert M. Feustel, president of the company at Fort Wayne, has made this plain.

It was reported in Fort Wayne that the Insull interests paid practically par for the entire preferred and common stock holdings of the local company, but confirmation of the terms of the sale has not been made. Mr. Feustel says the company will continue to function as a local organization, with much the same staff for the present at least.

In addition to the city lines in Fort Wayne, the Indiana Service Corporation operates the city lines in Wabash, Peru and Logansport and the interurban lines to Lafayette, Bluffton, Waterloo and Kendallville. Its properties also include the light and power plants which supply Fort Wayne.

San Francisco Municipal Loss \$295,230

For the Year Ended June 30, 1924, the Excess of Income Over Operating Expenses and Reserves Was \$8,374, but Taxes and Similar Items Amounted to \$303,604

TOTAL revenue of the Municipal Railway, San Francisco, Cal., for the year ended June 30, 1924, was \$3,189,533, and interest on securities owned increase this by \$46,519 to \$3,236,052. Deducting operating expenses of \$2,460,282 left a net of \$775,770. Against this \$196,223 was charged interest on funded debt and \$571,173 for depreciation and accidents, leaving a balance of \$8,374, compared with \$13,830 for the previous year.

For the purpose of securing a comparison between the results of operation of the municipally owned utility and those operated by private capital,

the charter of the city and county of San Francisco provides that the operating reports shall include certain comparison charges consisting of items which constitute part of the actual cost of operating private-owned companies, but which the municipally owned utility is not required to pay. For the year these charges amount to \$303,604, leaving a net deficit of \$295,230. This compares with a similar deficit for the preceding year of \$272,045.

There has been a continuing deficit, as shown by the cumulative income account for the period from Dec. 28, 1912, to June 30, 1923, amounting to \$1,024,-

COMPARATIVE INCOME ACCOUNT, SAN FRANCISCO MUNICIPAL RAILWAY

	—Years Ended June 30—		Dec. 28, 1912 to June 30, 1924
	1923	1924	
Passenger revenue.....	\$2,993,829	\$3,173,181	\$25,415,189
Miscellaneous revenue.....	11,372	16,352	110,356
Total revenue.....	\$3,005,201	\$3,189,533	\$25,525,545
Interest on securities owned.....	55,297	46,519	316,674
Total income.....	\$3,060,498	\$3,236,052	\$25,842,219
Operating expenses:			
Way and structures.....	\$109,572	\$115,468	\$799,920
Equipment.....	216,605	187,636	1,495,486
Power.....	424,695	465,889	3,369,704
Conducting transportation.....	1,371,843	1,523,269	11,000,120
Traffic.....	16	109	3,836
General and miscellaneous.....	179,325	167,911	964,369
Loss on road retired.....			8,187
Total operating expenses.....	\$2,302,055	\$2,460,282	\$17,641,622
Excess of income over operating expense.....	\$758,443	\$775,770	\$8,203,597
Less interest on funded debt.....	205,724	196,223	2,374,963
Excess of income over operating expenses and interest.....	\$552,719	\$579,547	\$5,828,634
Less reserve for depreciation and accidents (18 per cent of gross passenger revenue).....	538,889	571,173	\$4,573,836
Excess of income over operating expenses, interest, depreciation and accident reserves.....	\$13,830	\$8,374	\$1,251,798
Less charter comparison charges.....	285,876	303,604	2,276,184
Net income.....	\$272,045	\$295,230	\$1,024,385
Analysis of comparison charges:			
*State franchise tax—4½ per cent of gross earnings.....	\$157,775	\$167,442	\$1,338,556
†Municipal franchise tax—3 per cent of gross earnings.....	119,753	126,928	824,158
Municipal car license.....	2,835	3,135	30,258
Federal income tax.....			13,270
Salary of clerks.....			4,872
Law expenses.....			13,500
Insurance.....	5,513	6,099	51,570
Total.....	\$285,876	\$303,604	\$2,276,184

* Franchise tax percentage has varied in different years. † Municipal franchise tax now increased to 4 per cent. Italics indicate loss or deficiency.

STATISTICAL DATA, SAN FRANCISCO MUNICIPAL RAILWAY
FISCAL YEAR ENDED JUNE 30, 1924

	Total Amount	Per Car-Mile (Cents)	Per Car-Hour	Ratio to Passenger Revenue
Total passenger revenue.....	\$3,173,181.33	36.57	\$3.5249	
Total operating expenses (taxes and depreciation not included).....	2,460,282.85	28.36	2.7330	
Total operating earnings (taxes and depreciation not included).....	712,898.48	8.21	0.7919	0.2246
Total taxes and charter charges.....	303,604.17	3.50	0.3373	0.0957
*Depreciation.....	571,172.64	6.58	0.6345	0.1800
Operating expenses, depreciation and taxes.....	3,335,059.66	38.44	3.7048	1.0510
Net deficit from operation.....	161,878.33	11.87	0.1798	0.0610
†Passenger car mileage.....	8,676,611			
‡Passenger car-hours.....	900,224			
§Platform expense (62½ cents per hour July 1, 1923, to Sept. 15, 1923, inclusive; 67½ cents per hour Sept. 16, 1923, to June 30, 1924, inclusive; bus operators 72½ cents)	1,269,472.65	14.63	1.4102	

	Total Amount	Total Amount	
Number of passenger cars owned.....	209	Free transfers.....	12,808,537
Number of work cars owned.....	4	Free passengers (employees, etc.).....	603,788
Total number of cars owned.....	213	Total passengers carried.....	77,736,617
Total number of buses owned.....	10	Number of passengers carried per car-mile... 8.96	
Total single-track mileage.....	68.98		
Passengers carried—5-cent fares.....	62,954,052		
5-cent fares—Government tickets.....	46,950		
2½-cent fares—school tickets.....	995,854		
2-cent revenue transfers.....	327,436		

* The sum of \$200,000 expended from depreciation reserve for bond retirement. † Includes mileage of buses. ‡ Includes car-hours of buses. Italics indicate loss or deficiency.

386, when the comparison charges are included. Neglecting these, there has been an excess of income over operating charges, interest and reserves of \$1,251,798 for the same period.

Particular attention is given in the report to the explanation of the items in the balance sheet, which is reproduced in condensed form herewith. The capital assets consist of cash in bond funds, \$17,428, which represents unexpended balance of the bond fund cash now in possession of the treasurer; road and equipment, \$7,570,225, and general expenditures, \$324,873. These latter accounts represent the total cost of the road and equipment.

The current assets consist of \$943,635 cash in various funds, \$979,325 for the book value of the securities bought for the account of the depreciation fund; accounts receivable, \$14,148; materials and supplies, \$237,815.

Deferred assets have not changed during the year.

On the liabilities side, the funded debt item represents the par value of the bonds outstanding in the hands of the public on June 30, 1924. Current liabilities include accounts and vouchers payable, \$221,946, and interest due on funded debt, \$47,773. The reserves include a reserve for depreciation of \$1,467,977 and a reserve for compensation insurance of \$100,492.

The municipal railway has no capital stock and the excess of its assets over its liabilities represents surplus. In

the preparation of the balance sheet, it is stated, this surplus has been divided into two classes, first, that which was created by donations or contributions, and, second, that which was accumulated from the earnings resulting from the operation of the road. The contributed surplus includes premiums realized from the sale of bonds, \$26,000, and contributions from general taxes, \$306,552. In surplus from income is included \$1,489,000 representing bonds retired from income; \$101,000 reserve

COMPARATIVE CONDENSED GENERAL BALANCE SHEET, SAN FRANCISCO MUNICIPAL RAILWAY, AS OF JUNE 30, 1924

Assets	1924	1923	Increase or Decrease
Capital assets....	\$7,912,526	\$7,610,138	\$302,387
Current assets..	\$2,174,925	\$2,241,396	\$66,470
Deferred assets..	\$132,124	\$132,122	.....
Total assets....	\$10,219,575	\$9,983,659	\$235,916
Liabilities, Reserves and Surplus			
Funded debt....	\$3,992,000	\$4,192,000	\$200,000
Current liabilities	\$269,720	\$343,126	\$73,406
Reserves.....	\$1,568,469	\$1,615,740	\$47,270
Contributed surplus.....	\$332,552	\$332,552	
Surplus from income.....	\$4,056,832	\$3,500,238	\$556,594
Total surplus....	\$4,389,385	\$3,832,791	\$556,594
Total liabilities, reserves and surplus....	\$10,219,575	\$9,983,659	\$235,916
Italics indicate loss or deficiency.			

for bond redemption. These amounts, totaling \$1,590,000, represent the income which has been set aside in cash for the redemption of bonds.

An item of considerable interest to railway operators is the charter reserve of \$903,802 for insurance and taxes. As explained previously, there are set aside certain sums for comparison with private operation, of which this item is a part. The municipal system not having to pay any of these charges, the receipts from operation were deposited in the operating cash fund without any restrictions as to how they were to be used. As a matter of fact, however, most of the cash in the operating fund represented by such comparison charges actually was expended in new construction and addition and betterment work, so that these reserves, representing obligatory char-

ter comparison charges, have in reality been used as reserves for betterments.

For the purpose of making the balance sheet reflect the actual results of operations, it is stated, the amount expended in addition and betterment work has been reflected in an account entitled "additions and betterments from income," and the charter reserves for insurance and taxes carry a balance equal only to the unused portion of the original income. The amount in the additions and betterments account is \$2,199,388.

Operating surplus is made up as follows:

Surplus, June 30, 1923, as per last report...	\$484,477
Add:	
Reduction of compensation insurance reserve corresponding to dividends declared by the state compensation insurance fund applicable to year ended June 30, 1924.....	\$14,946
Transfer from depreciation fund to operating fund as follows:	
Deficits in operating fund	60,639
Insurance refund credited to accident insurance reserve but deposited in operating fund.....	1,679
	77,264
Deduct:	
Amount transferrable from income account.....	\$295,230
Interest on bonds credited to income but deposited in depreciation fund.....	46,519
Adjustment reconstruction of lower Market Street tracks	19,518
	361,267
	\$768,481
Italics indicate loss or deficiency.	

The statement of bus line operations for the year shows total revenues of \$45,323, compared with \$39,875 last year, and expenses of \$65,184, compared with \$61,302 the previous year, giving a net loss for the year of \$19,861, compared with \$21,427. In 1922 the net loss was \$29,086 on a total gross of \$38,863. These figures, however, do not include any supervision or other overhead or comparison charges.

Customer Ownership Campaign on in St. Joseph

The St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., started its second customer-ownership campaign on Feb. 16 to be in effect until Feb. 28. The security is preferred stock of the Cities Service Company, which controls the St. Joseph property. The employees are all interested in making the campaign more successful than last year's and are anxious to exceed their sales by a substantial number. The New York office has set the St. Joseph quota at 2,500 shares. An offer of \$7,000 in prizes and commissions has been made to employees who sell the greatest number of shares.

Twelve important steps in selling the Cities Service preferred stock were outlined in the February number of "Rylite Employees' News," the company's official publication. The employees were advised to tell the prospect that his purchase would make him part owner of the company's substantial properties and that he would share in the company's earnings.

STATEMENT OF BUS LINE OPERATIONS,
SAN FRANCISCO MUNICIPAL RAILWAY,
YEAR ENDED JUNE 30, 1924

Revenues:	
Passenger revenue.....	\$33,323
Quartermaster tickets.....	5
School tickets.....	639
Local transfers.....	11,356
Total revenues.....	\$45,323
Operating Expenses:	
Repairs to buses.....	\$12,445
Tire expense.....	10,350
Garage expense.....	13,317
Conductors and chauffeurs.....	21,936
Depreciation (18 per cent of gross passenger revenue).....	5,998
Compensation insurance.....	1,138
Total operating expenses.....	65,184
Net loss for year.....	\$19,861
Average net loss per day.....	\$4.26

January a Record Month
for Boston "L"

The Boston Elevated Railway, Boston, Mass., reports the largest surplus for any January since the road was turned over to public trustees.

In submitting his report for the month Edward Dana, general manager, says that the savings were accomplished by the most rigid economy and without curtailment or impairment of service. The company carried 33,305,311 passengers, received from all sources \$3,130,996 and paid out \$2,861,347, which leaves an excess of receipts over cost of service of \$269,649. The

	1925	1924
Revenue passengers:		
10-cent passengers....	26,813,722	25,079,496
5-cent passengers....	1,138,715	9,337,482
6-cent passengers....	5,352,874	.....
Total revenue passengers.....	36,305,311	34,416,978
Total receipts per revenue passenger.....	9.401c.	8.855c.
Receipts from fares per revenue passenger....	9.186c.	8.643c.
Cost of service per revenue passenger.....	8.591c.	8.490c.
Total payroll included in operating expenses	\$1,453,173.97	\$1,451,724.35
Payroll cost per revenue passenger.....	4.363c.	4.218c.

natural increase in wages from the arbitration award would have been \$40,000, but the actual increase was only \$1,400 because 400 employees were laid off and the repair shops were put on a 5-day basis.

By increasing the safety factor, operating more safely, reducing accidents and incidentally accident insurance, the company cut its expenses for the law department, injuries and damages and insurance from \$141,310 in January, 1924, to only \$77,431 last month. Coal was bought at an average figure of \$5.37 per ton as against \$6.30 per ton a year ago, and the consumption was reduced by the higher efficiency engines, from 27,326 tons in January a year ago to 25,445 tons in January of this year.

Purchases Interurban Tracks

The City Commission of Dallas, Tex., recently gave the Dallas Railway permission to requisition \$123,675 to purchase the Forney Avenue line from the Texas Interurban Railway. The company will give a note for the purchase price and pay the interest out of the

company's authorized 7 per cent return on property values.

This line was built by the interurban company for the Terrell-Dallas line, but the Dallas Railway rented the trackage for local service. Under the new arrangement the Dallas Railway will have title to the lines and the Texas Interurban Railway will pay an annual rental of \$3,000 for the interurban service.

Valuation of New York State Railways Reduced

The city of Rochester has reached an agreement with the New York State Railways in its long-pending suit for a reduction of the base valuation of the Rochester lines of the company, whereby the value under the service-at-cost contract will be cut from \$19,216,000 to \$18,076,000, a reduction of \$1,140,000.

The figure agreed upon represents a compromise on the part of both parties, as the railway some time ago offered to reduce the value by \$1,005,000. This proffer was rejected. The matter now is before the Common Council and acceptance is said to be assured.

The amount of the reduction, Corporation Counsel C. M. Platt said, is too small to allow any immediate reduction in the present 7-cent fare. Under the service-at-cost contract the railways must show a surplus of \$200,000 in its balancing accounts before a fare cut is possible. The railways for the 4 years of operation under the contract have failed to show such return.

Dividends and Directors in Brooklyn.—The Brooklyn City Railroad, Brooklyn, N. Y., declared a quarterly dividend of 20 cents, payable March 2 to stock of record Feb. 14. Three months ago the company declared a quarterly dividend of 20 cents and 5 cents extra. Thomas I. Parkinson, vice-president of the Equitable Life Assurance Society, and Clinton E. Morgan, vice-president and general manager of the road, were elected directors.

Contract Agreement Reached.—Agreement over the question of valuation has finally been reached between the officials of the Milwaukee Electric Railway & Light Company and the public utilities acquisition committee,

which are negotiating the proposed service-at-cost contract. It places a valuation of the company's properties at \$56,456,506 as of July, 1925, the date when the contract is to become effective, providing the vote is in favor of the plan. This figure will be replaced by the exact amount determined when the audit of the company's books is completed up to that time. The audit is now completed up to Jan. 1, 1922, which establishes a valuation at that time of \$42,382,000.

Receipts Higher in January This Year.—Total passenger revenues of the Indianapolis Street Railway, Indianapolis, Ind., for January were \$449,657. This is a decrease of \$17,091 compared with the previous month, but contrasted with total receipts for January of last year revealed an increase of \$21,683.

Railway Included in Merger.—The Maine Public Utilities Commission recently rendered a decision authorizing the Bangor Railway & Electric Company, Bar Harbor & Union River Power Company, the Bangor Power Company and the Lincoln Light & Power Company to consolidate with the Bangor Hydro Electric Company.

No Intervention for Protection Necessary.—When the time arrives for a settlement under the reorganization of the United Railways of St. Louis all judgment creditors of the company prior to the receivership will have an opportunity to protect their interests. Federal Judge Faris so informed John V. Lee, counsel for judgment creditors holding claims for \$129,000 against the company. Judge Faris overruled Counsel Lee's request to intervene in the receivership suit. The court told Mr. Lee there was no necessity for him to intervene as all those interested in the reorganization would receive proper consideration. In overruling a similar motion many weeks ago Judge Faris stated he had been assured the judgment creditors would be paid off in full when the reorganization was accomplished.

Railway at Public Sale.—The Phoenixville Trust Company as trustee for the bondholders will offer at public sale on March 11, 1925, at the Phoenix Hotel, Phoenixville, Pa., all the property of the Phoenixville, Valley Forge & Strafford Electric Railway, a 4½-mile trolley. Included in the sale will

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Street Railway Fares*	Feb. 1925	Jan. 1925	Feb. 1924	May 1921	May 1922
1913 = 4.84	7.17	7.17	6.93	7.24	6.88
Street Railway Materials*	Feb. 1925	Jan. 1925	Feb. 1924	Sept. 1920	Oct. 1924
1913 = 100	153.1	150.3	163.2	247.5	148.5
Street Railway Wages*	Feb. 1925	Jan. 1925	Feb. 1924	Sept. 1920	Mar. 1923
1913 = 100	221.0	221.0	217.4	232	206.8
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	Jan. 31 1925	Dec. 31 1924	Jan. 31 1924	July 31 1920	July 31 1924
	5.04	4.82	4.80	11.12	3.19
U.S. Bank Clearings Outside N. Y. City (Billions)	Jan. 1925	Dec. 1924	Jan. 1924	Mar. 1920	Feb. 1922
	18.53	18.45	16.86	18.54	10.65
Business Failures Number	Jan. 1925	Dec. 1924	Jan. 1924	Jan. 1924	Sept. 1924
Liabilities (Millions)	2344	1911	2231	2231	1277
	64.01	57.77	122.95	122.95	27.71

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of

Conspectus
of
Indexes
for
February,
1925

Compiled for Publication in this Paper
by
Albert S. Richey
Electric Railway
Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Eng. News-Record Construction costs 1913 = 100	Feb. 1925	Jan. 1925	Feb. 1924	June 1920	Mar. 1922
	299.7	210.4	220.3	273.8	162.0
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Jan. 1925	Dec. 1924	Jan. 1924	May 1920	Jan. 1922
	160.0	157.0	151.2	247	138
Bradstreet's Wholesale Commodities 1913=9.21	Feb. 1 1925	Jan. 1 1925	Feb. 1 1924	Feb. 1 1920	June 1 1921
	13.89	13.93	13.20	20.87	10.62
Dun's Wholesale Commodities 1913 = 120.9	Feb. 1 1925	Jan. 1 1925	Feb. 1 1924	May 1 1920	July 1 1921
	204.6	202.6	191.1	263.3	159.8
U.S. Bur. Lab. Stat. Retail food 1913 = 100	Jan. 1925	Dec. 1924	Jan. 1924	June 1920	Mar. 1922
	154.3	151.5	149	219	139
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	Jan. 1925	Dec. 1924	Jan. 1924	July 1920	Aug. 1922
	167.1	166.1	164.6	204.5	154.5

materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials.

Wages index is relative average maximum hourly wage of motormen, conductors and operators on 100 of the largest street and interurban railways in the United States, weighted according to the number of such men employed.

be Pleasure Park, near Valley Forge, and about 12 acres of land. The road runs from Main and Church Streets, Phoenixville, Pa., to the village of Valley Forge and the Pennsylvania State Park, embracing the encampment grounds of Washington's army. Early last year it was stated that no buyer for the road could be found and the creditors' committee had decided that it would be best for the bondholders to purchase it and sell it for scrap.

Changes in Effect to Improve Business.—Receiver Henshaw of the Oklahoma Railway, Oklahoma City, Okla., has purchased the Katy railway passenger station at Guthrie with four and one-half blocks of yards and 7,000 ft. of railroad track by the Oklahoma Railway for \$10,000. The purchase is to enable the electric railway to increase freight business. The receivers have outlined a reorganization plan calling for the expenditure of \$50,000 on the Guthrie division, which is expected to reduce annual operating cost of that division by more than \$40,000.

January Shows Profit.—January operations of the Community Traction Company, Toledo, Ohio, resulted in a profit of \$14,952 for the stabilizing fund. Gross earnings were \$334,874 and operating expenses \$257,433, leaving a net profit of \$77,441. Non-operating income added \$3,035. Bond interest was \$36,390 and the sinking fund requirement \$22,512. This left \$21,400 applicable to preferred dividends and stabilizing fund. Dividends on the preferred stock outstanding were \$7,153.

Seeks Abandonment Permission.—The Pennsylvania-Ohio Electric Company, Youngstown, Ohio, has asked the Public Service Commission to permit it to abandon its railway between Hubbard, Ohio, and New Castle, Pa.

Dividend Suit Dismissed.—Suit to force distribution of nearly \$2,000,000 as dividends to stockholders of the Chicago City Railways, Chicago, Ill., has been thrown out of court by the federal appellate judges who upheld a lower court ruling which involved the validity of the 1907 traction ordinances of Chicago.

City May Retire from Interests Outside City.—The city of Winnipeg, Man., will confine its traction activities to Winnipeg proper and retire from adjacent municipalities under a plan which has been submitted to the City Council and shareholders of the Winnipeg Electric Company, according to a recent report. If the plan is accepted by the city and the shareholders competition between the city and the company in the street railway business will be eliminated. The city would also buy the company's surplus current. Early in the present year it was said that a special committee might be appointed by the new City Council to consider the advisability of taking over the railway from the Winnipeg Electric Company.

Electric Branch Line Under Consideration.—The Philadelphia & Reading Railway is negotiating for the purchase of the Princeton branch of the New Jersey & Pennsylvania Traction Corporation, Trenton, N. J., for a freight line between Trenton and Princeton.

Personal Items

C. A. Brooks Leaves Poughkeepsie

Manager There Joins Fitkin & Company, Bankers and Utility Operators, in Charge of Railway Properties

Charles A. Brooks, general manager of the Poughkeepsie & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., for the J. G. White Management Corporation, will on March 1 become associated with the general engineering and management corporation of A. E. Fitkin & Company, New York City, in charge of its electric railway properties. The Fitkin holdings include both city and interurban lines.

Mr. Brooks went to Poughkeepsie in April, 1913, after having served as a

Mr. Brooks has been president of the local Chamber of Commerce for nearly two years. In addition he is president of the Poughkeepsie Automobile Club, and is affiliated with many other local organizations. He is a member of the Amrita, Poughkeepsie Rotary, and Dutchess Golf and Country Clubs, and of the Transportation Club of New York City. He is a Knight Templar.

The Poughkeepsie *Eagle-News* said:

Mr. Brooks has demonstrated that he is a man of high capabilities and of outstanding public spirit. As manager of the railway he has filled one of the most difficult positions in the community. He has had to contend with the same conditions which in other cities have made the operation of traction lines an exacting business in the last decade. Mr. Brooks succeeded in increasing the efficiency of service, despite formidable handicaps, and under his supervision the physical property of the company has been almost entirely rebuilt. Any fair review of his management must concede that he has done an extraordinarily fine piece of work. Mr. Brooks's services to the city through the Chamber of Commerce have been likewise notable.

Mr. Brooks takes up his new duties with a background of experience which will serve him in good stead. Poughkeepsians will be glad that he has obtained at least a part of that experience in this city, and will wish for him the success which they are sure will be his.



C. A. Brooks

Chicago Officials Advanced

At the annual meeting of the Chicago Rapid Transit Company, Chicago, Ill., operating the Elevated lines there, the title of B. J. Fallon was changed to vice-president in charge of operations. H. A. Johnson was given the title of general manager.

Mr. Fallon has been general manager since the summer of 1921. His promotion at that time had been the second within a period of a little longer than a year, his other positions being those of assistant general manager and engineer maintenance of way. His record of efficiency and achievement was reviewed in the *ELECTRIC RAILWAY JOURNAL*, issue of July 9, 1921.

H. A. Johnson, who now assumes the rôle of general manager, has also had a notable career in the railway field. He was formerly assistant to the general manager of the Chicago Rapid Transit and superintendent of shops and equipment of the Chicago, North Shore & Milwaukee Railroad. He was a member of the committee from the American Electric Railway Association sent abroad last year to study foreign practice. Recently, he was appointed director of research of the American Railway Association to take full charge of an extensive investigation of power brakes for both passenger and freight trains. The details of his career were published in the *ELECTRIC RAILWAY JOURNAL*, issue of Dec. 20, 1924.

S. B. Way, vice-president and general manager of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has been elected president of the Peninsular Power Company, the properties of which were recently acquired by the North American Com-

member of the J. G. White staff in New York. He had been identified with the traction business since 1902, when he entered the employ of the Brooklyn Rapid Transit Company. Later he was with Sanderson & Porter, New York, but left their employ to enter the service of the Third Avenue Railroad, New York City. Then followed a period in which he directed the construction of the South Shore traction lines in Long Island, and in 1912 he joined the staff of the White Corporation as a special engineer.

Since he went to Poughkeepsie Mr. Brooks has been in charge of the railroad there except during the period from May, 1922, to November, 1923, when he was associated with Ward S. Lent in the Lenbrook Motor Corporation. Upon the death of R. J. Morrison, who had succeeded him as manager at Poughkeepsie, Mr. Brooks returned to his old position.

Under his direction the company at Poughkeepsie has purchased and put into operation an entire new equipment of rolling stock and has virtually rebuilt its lines. Ninety-five per cent of its trackage and pavement within the city has been replaced since 1913, under his personal direction.

pany. A. K. Ellis, general superintendent of the Wisconsin Traction, Light, Heat & Power Company, has been named vice-president, and F. J. Boehm, secretary and treasurer.

Wallace Shaw has succeeded Joseph P. Hines as general manager of the Nahant & Lynn Street Railway, Nahant, Mass. Thomas Fee is roadmaster, replacing Arthur Hollis.

J. Sandie has succeeded Alexander McCready, deceased, as master mechanic of the Sault Ste. Marie Traction Company, Sault Ste. Marie, Mich. J. H. Stewart has succeeded J. N. Franz as superintendent.

L. H. McCray, formerly assistant general manager of the East Penn Electric Company of Pottsville, Pa., has been elected vice-president of the New Hampshire Electric Railways. He will be in charge of the operation of the Massachusetts Northeastern Street Railway and the Dover, Somersworth & Rochester Street Railway in addition to light and power properties. Ralph Hood will continue as manager of the Massachusetts Northeastern Street Railway and the Dover, Somersworth & Rochester Street Railway.

J. P. Hudson, auditor of the Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont., has had his jurisdiction extended to include the accounts of the Toronto Suburban Railway. Mr. Hudson will report direct to T. H. Cooper, general auditor, Montreal. H. J. Harris has been appointed assistant auditor with office at Lambton, Toronto, Ont.

Carl C. Jones has been promoted to division ticket and freight agent of the Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind. This is a newly created office, to supervise all freight, express and baggage business which heretofore has been connected with the railway baggage department. The new arrangement separates the freight service entirely from the transportation department, which will allow M. M. Nash, superintendent of transportation, and his workers an opportunity to devote their entire time to traffic and transportation problems.

O. S. Hanson was elected treasurer of the Grand Forks Street Railway, Grand Forks, N. D., at the recent annual meeting. In this capacity he succeeds A. I. Hunter.

C. F. Crane, assistant to the president of the Harrisburg Railways, Harrisburg, Pa., was recently elected treasurer of the Pennsylvania Street Railway Association. At the same meeting Harold A. Buch was elected secretary. Mr. Buch was an assistant to the late Henry M. Stine, secretary and treasurer of the association.

Capt. W. V. Morland, manager of the Nottinghamshire & Derbyshire Tramways and the Midland General Omnibus Company, Nottinghamshire, England, has been appointed manager of the St. Helens Corporation Tramways.

Clarence Kline, purchasing agent, claim agent and superintendent of the Enid City Railway, Enid, Okla., is now vice-president of the Tulsa Street Railway, Tulsa, Okla. Mr. McGrath succeeded Mr. Kline at Enid.

E. W. Dickinson is retiring from the post of power station engineer of the London County Council Tramways, London, England, and will receive a retiring allowance. He has been on the permanent staff since 1906.

Obituary

F. P. Maize

F. P. Maize, master mechanic of the Portland Electric Power Company, Portland, Ore., since 1911, died recently. Mr. Maize was in the railway field for many years, his first connection being in the shops of the Carlisle Manufacturing Company, locomotive builders, which he served from 1885 to 1893. He then became foreman of the machine shop of the Atlantic Avenue Railroad in Brooklyn and a year later accepted a position with the Scranton traction company.

It was at the time he was connected with the Scranton property that Mr. Maize took up the study of the subject of mechanical and electrical engineering. This equipment enabled him to perform with even greater zeal the duties of foreman of repair shops of the second division of the Union Traction Company, Philadelphia. Each position seemed to fit him for something higher and a year later he became master mechanic of the New York & Queens County Railway, Long Island City, later being promoted to superintendent of power houses and equipment.

From 1903 until the summer of 1908 Mr. Maize was master mechanic of the Rochester Railway, in the latter year resigning to become a mechanical instructor of the Public Service Corporation of New Jersey and in general charge of the repair shops of the company throughout New Jersey. He next moved to Portland, Ore., where he has been employed for the past 14 years.

Job E. Hedges

Job E. Hedges, humorous speaker, political philosopher, lawyer and former receiver of the New York Railways, New York City, died at his rooms in the Chalfonte Hotel at Atlantic City, N. J., on Feb. 22. The death, which was sudden, was caused by heart disease, of which Mr. Hedges has suffered several previous attacks. He was 62 years old.

In 1914 Mr. Hedges was defeated for Governor of New York by William Sulzer, the Democratic candidate. After Mr. Sulzer's impeachment and the succession of the late Martin H. Glynn to the Governorship, Mr. Hedges became a candidate for the nomination again in 1914.

The New York Times said that in the opinion of many of his friends, Mr. Hedges' reputation as a humorist was a decided handicap to him politically, and that it was certain his reputation as a wit prevented many epigrams of political philosophy of his being taken with the seriousness that they deserved.

Mr. Hedges always took an active part in Republican State and national conventions. He placed Charles E. Hughes in nomination for Governor in 1906 and supported Mr. Hughes in the campaign.

In a speech at a dinner of the University of Vermont alumni, he said:

The only difference between the Governor of Vermont and the Mayor of this city is that the Governor says nothing and does a whole lot while the Mayor says a whole lot and does nothing. When the Mayor has more to say than usual he seeks redress in the City Record.

Mr. Hedges' wit continued undimmed by failing health. When criticised by Mayor Hylan for action as a surface railway receiver, Mr. Hedges retorted by referring to the Board of Estimate and Apportionment as "a board that neither estimates nor apportions."

C. M. Murdock

Charles M. Murdock, Lafayette, Ind., vice-president of the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., died of heart disease Feb. 8 at his home in that city. He had been ill several years. The day prior to his death he visited the First Merchants National Bank, Lafayette, of which he was chairman of the board of directors, but that night appeared restless and at 7 o'clock, when the nurse tried to awaken him, she found he was dead. He was 60 years old.

With his father and brother Mr. Murdock organized the first gas company in Lafayette and later the Lafayette Lighting Company. These utilities are now combined as the Northern Indiana Gas & Electric Company. He and his brother also were pioneers in interurban development. They became interested years ago in the Terre Haute, Indianapolis & Eastern Traction Company, the Fort Wayne & Wabash Valley Traction Company, the Evansville & Southern Traction Company and the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway. Mr. Murdock also was interested in several banks.

William M. Lawyer, connected with the E-Z Car Control Corporation, Turnstile Car Corporation and Haller-Powers Printing Company, Syracuse, N. Y., is dead. Mr. Lawyer was born in Oswego County, New York, on June 19, 1874. After being educated in public schools of his native district he worked for the Buffalo, Rochester & Pittsburgh Railroad and later entered the employ of the New York Central Railroad, continuing with the latter until he had completed 10 years of service. He then went to Cleveland, Ohio, where he was associated with the Whitmore Manufacturing Company, manufacturers of lubricants, as salesman and Eastern representative for 16 years. Next he engaged in manufacture and distribution of railroad supplies in Syracuse and in March, 1922, he helped to organize the Turnstile Car Corporation.

Edward W. Gross, treasurer and general manager of the Berlin Street Railway, Berlin, N. H., died recently in Auburn, Me. In the early '80s in Lewiston and Auburn Mr. Gross organized the American Light & Power Company, becoming treasurer and manager. Twenty-two years ago he secured control of the Berlin Street Railway and as treasurer and general manager devoted all his energy to putting the company on a sound financial basis. Mr. Gross was 87 years old.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Jacksonville Coal Agreement Stimulates Non-Union Mining

The Jacksonville agreement between bituminous coal operators and the United Mine Workers is not working out in an entirely satisfactory manner, according to the opinion in well-informed quarters in Washington. It is stimulating greatly the production from non-union mines. One effect is the keeping in operation of inefficient mines in non-union territory and closing efficient mines in the union area. Nevertheless, the alternative to the Jacksonville agreement was a strike, and the present situation is preferable to one which would have followed such a course.

The union probably is not ready to concede it, but the trend among the men is to make wage concessions. It is regarded as entirely preferable that this suggestion should come from the men rather than from their employers. The coal industry, however, still is reaping the harvest, it is declared, of war distortions, of transportation inefficiencies and of the mismanagement which characterized the decade preceding the Jacksonville agreement.

Buses to Be Exhibited at Boston Show

Buses will constitute a substantial and special feature of the annual Boston Automobile Show in Mechanics Building on March 7 to 17. Many different sizes and types will be displayed. Some exceptionally fine buses are being built for service in New England this spring, and some of them will be on display at the Boston show before they are placed in service.

Gould Coupler Taken by Symington Interests

The Gould Coupler Company, New York, has been purchased from Charles J. Graham of the Graham Bolt & Nut Company by a banking group acting in behalf of interests connected with one of the largest railway supply companies. Announcement to this effect was made on Feb. 6. On Feb. 10 it was made public that the purchase of the Gould Coupler Company and the Gould Storage Battery Company was for the Symington interests.

Confirmation of these changes and of other details of the proposed new financing was obtained through Blair & Company, New York, on Feb. 26. At that time public offering was made of 175,000 shares of participating Class A shares of the Gould Coupler Company of Maryland. This company has acquired the plants, equipment, patents, trade names, etc., of Gould Coupler Company, a New York corporation, as a going concern. The business of the

company was started 43 years ago under the title of Gould & Stimson. In 1890, the Gould Coupler Company was incorporated in West Virginia, and was succeeded in 1903 by a corporation of the same name chartered in the State of New York.

Simultaneously with this move, Charles A. Gould, who has been president of the company since its inception, is retiring from business at the age of 76 years and has been succeeded as president by his son, William S. Gould, who has been identified with the business for many years as vice-president. The executive and operating personnel will continue as heretofore with no other material change.

The Symington Company is acquiring a majority of the common shares of the new Gould company.

Electric Locomotive Shipments \$3,500,000

Shipments of electric locomotives for the quarter ended Dec. 31, 1924, totaled 167, valued at \$901,842, against 148, with a value of \$738,540, for the quarter ended Sept. 30. Shipments for the year 1924 were 655, valued at \$3,483,150, against 1,334, worth \$6,221,170, in 1923. These figures are in accordance with the findings of the Department of Commerce.

Upward Trend of Gasoline Prices Quite Natural

A table of tank-wagon prices compiled by Dow, Jones & Company, New York, for 30 principal cities of the United States, shows an average price for gasoline was 15.6 cents a gallon on July 29, 15.21 cents on Aug. 29, 14.44 cents on Sept. 17, 14.64 cents on Sept. 20 and 13.59 cents a gallon on Oct. 3. It is explained that this steady decline was brought about by cheapness of crude, which, in turn, was attributable to overproduction that during the year added 19,843,000 bbl. to the 333,053,000 already held in storage at the end of

With the recent falling off in production and the improvement in crude oil prices gasoline has advanced 3.67 cents a gallon from the average low point of early October, the present average price being 17.26. Since Jan. 1, 1925, crude has advanced from \$1.10 to \$1.80 a barrel, net of 70 cents.

The yield of gasoline per barrel of crude varies with refining methods and the grade of crude oil, but averages about 30 per cent. In other words, a 42-gal. barrel of crude yields about 13 gal. of gasoline on the average, and other products and refining losses account for the remainder.

In commenting on these facts the *Wall Street Journal* admonishes its readers to remember that refiners were selling gasoline throughout the summer of 1924 at prices that would hardly yield a fair return on the investment, and that in all fairness present prices should allow them to recoup such losses as they sustained.

Oil men themselves explain that the recent upward change in prices is merely a manifestation of a natural economic sequence.

ELECTRIC RAILWAY MATERIAL PRICES—FEB. 26, 1925

Metals—New York

Copper, electrolytic, cents per lb.	14.687
Lead, cents per lb.	9.175
Nickel, cents per lb.	31.00
Zinc, cents per lb.	7.87
Tin, Straits, cents per lb.	57.00
Aluminum, 98 to 99 per cent, cents per lb.	27.00
Babbitt metal, warehouse, cents per lb.:	
Fair grade	60.00
Commercial	28.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	\$4.45
Somerset mine run, Boston	2.125
Pittsburgh mine run, Pittsburgh	1.95
Franklin, Ill., screenings, Chicago	1.875
Central, Ill., screenings, Chicago	1.875
Kansas screenings, Kansas City	2.50

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	\$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	3.05
Tie plates (flat type), cents per lb.	2.425
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.075
Steel bars, cents per lb.	2.10
Ties, white oak, Chicago, 6 in. x 8 in. x 8 1/2 ft.	\$1.60

Hardware—Pittsburgh

Wire nails, base per keg	2.85
Sheet iron (28 gage), cents per lb.	5.50
Sheet iron, galvanized (28 gage), cents per lb.	4.75
Galvanized barbed wire, cents per lb.	3.55
Galvanized wire, ordinary, cents per lb.	2.60

Waste—New York

Waste, wool, cents per lb.	16
Waste, cotton (100 lb. bale), cents per lb.:	
White	13-19
Colored	10-15

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	\$1.20
White lead (100 lb. keg), cents per lb.	0.1625
Turpentine (bbl. lots), per gal.	0.94
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4-6

* Prices f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	17.00
Rubber-covered wire, No. 14, per 1,000 ft.	\$7.00
Weather-proof wire base, cents per lb.	19.50

Paving Materials

Paving stone, granite, 4x8x4, f.o.b. Chicago, dressed, per sq. yd.	
Common, per sq. yd.	
Wood block paving 3 1/2 x 16 lb. treatment, N. Y., per sq. yd.	\$2.82
Paving brick 3 1/2 x 8 1/2 x 4, N. Y., per 1,000 in carload lots	51.00
Paving brick 3 1/2 x 8 1/2 x 3 N. Y., per 1,000 in carload lots	45.00
Crushed stone, 1-in., carload lots, N. Y., per cu. yd.	1.85
Cement, Chicago consumers' net prices, without bags	2.20
Gravel, 1-in., eu. yd., f.o.b. N. Y.	1.75
Sand, eu. yd., N. Y.	1.625

Old Metals—New York and Chicago

Heavy copper, cents per lb.	11.75
Light copper, cents per lb.	10.00
Heavy brass, cents per lb.	7.50
Zinc, old scrap, cents per lb.	4.25
Lead, cents per lb. (heavy)	7.50
Steel car axles, Chicago, net ton	\$19.25
Cast iron car wheels, Chicago, gross ton	19.25
Rails (short), Chicago, gross ton	20.25
Rails, (relaying), Chicago, gross ton	25.50
Machine turnings, Chicago, gross ton	12.25

Extensive Improvements Planned in New Orleans

Improvements planned by the New Orleans Public Service, Inc., New Orleans, La., during 1925 will cost approximately \$6,641,203. With the completion of the program planned for this year, the Public Service will have spent \$21,022,253 in 3 years. Among other things the improvements will include new machinery for the power houses and substations, changes in overhead and underground systems of distribution and machinery to increase the capacity of the gas department to 21,250,009 cu.ft.

Changes in American Car & Foundry Personnel

H. W. Wolff, vice-president of the American Car & Foundry Company, and G. R. Scanland, formerly auditor, have been elected to the board of directors of the company. Mr. Scanland has also been elected vice-president in charge of finance and accounts. Others elected were S. A. Maleppe, assistant treasurer, in place of S. S. De Lano, deceased; E. S. Block, assistant auditor, and A. E. Jackson, assistant treasurer.

Rolling Stock

Madison Railways, Madison, Wis., expects to purchase from the Yellow Coach Manufacturing Company, Chicago, three buses of the street-car type seating 29 passengers.

Municipal Railway of San Francisco, San Francisco, Cal., will purchase 10 all steel cars at a cost of \$16,000 each.

Minneapolis Street Railway, Minneapolis, Minn., expects to spend \$500,000 for some 50 buses and \$100,000 additional for a garage as soon as the bus ordinance is passed.

Track and Line

Grand Rapids Railway, Grand Rapids, Mich., expects to spend \$746,714 on relaying and building new track, making a total of \$2,081,737 spent for construction since 1919.

Denver Tramway, Denver, Col., plans to construct a new car line, a cross-town branch extending from Broadway to University Avenue and possibly beyond Colorado Boulevard when plans for reorganization and removal of receivership are completed. The line will be from 23 to 40 blocks long. This construction is part of the South Denver improvement program, providing for construction of a consolidated freight and passenger railroad station.

Key System Transit Company, Oakland, Cal., has been granted an extension of time by the Railroad Commission in which to construct double tracks across 41st Street and Piedmont Avenue in the city of Oakland, double tracks across Arroyo Avenue between York Drive and Ricardo Avenue at grade and a single track across Cambridge Way between York Drive and Ricardo Avenue at grade in the city of Piedmont.

Shops and Buildings

Public Service Railway, Newark, N. J., plans to erect a combination car-house and garage at New Brunswick, N. J., to be about 400 ft. long on Sanford and Delevan Streets and 200 ft. on Commercial Avenue. Six tracks would lead into the building. The garage would be 120 by 190 ft., with a 115-ft. pit. In addition there would be a bus repair shop, oil house and store room.

Wisconsin Power & Light Company, Fond du Lac, Wis., plans to build a modern interurban-bus terminal at Fond du Lac. Administrative and sales departments will also be located in this building. A train shed will be added to the building of sufficient size to provide ample space for the increasing number of buses in operation.

Trade Notes

Combustion Engineering Corporation, New York, N. Y., has announced the appointment of W. R. Quinn, former manager of the fuel oil department, as Pacific Coast agent, with headquarters in San Francisco. Mr. Quinn's territory will include the states of Washington, Oregon and California.

Economy Electric Devices Company, Chicago, Ill., announces the installation of 10 additional meters with inspection dials on the Denver Tramway's equipment. This installation completely equips all of the rolling stock on this property.

Allen D. Turner, formerly in charge of convention publicity for the Westinghouse Electric & Manufacturing Company, with headquarters at Pittsburgh, and more recently in charge of automotive equipment advertising at the Springfield, Mass., office, has been appointed publicity manager of the New England district office of the company with headquarters at 10 High Street, Boston.

Charles Piez, chairman of the board of the Link-Belt Company, Chicago, tells in the January number of *System* what he means by the "Exception Plan." "The man who has continually to work overtime is a poor executive," is the opinion of Mr. Piez. He says the executive cannot immerse himself in routine matters, but must hold himself free to take care of the exceptions. He is in effect an emergency man, and added that it would mean death to his usefulness if he made himself the slave of a time-table.

Okonite Company, Passaic, N. J., opened an office at 310 South Michigan Avenue, Chicago, on Feb. 1 and took over the sale of Okonite products in the Western territory. Charles E. Brown, formerly vice-president of the Central Electric Company, was appointed vice-president in charge of the territory west of Pittsburgh and east of the Rocky Mountains of the Okonite Company, with headquarters in Chicago. A. L. McNeill, formerly manager of the railroad department of the Central Electric Company, has been appointed manager of the railroad department. E. H. McNeill, formerly railroad sales

representative of the Central Electric Company, has been appointed sales engineer. Ray N. Baker, formerly railroad sales representative of the Central Electric Company, has been appointed sales engineer. L. R. Mann, formerly sales representative of the Central Electric Company, with headquarters at St. Louis, has been appointed manager of the St. Louis office. Joseph O'Brien, formerly railroad sales representative of the Central Electric Company, has been appointed sales representative, with headquarters in Chicago. C. E. Brown, Jr., formerly country sales manager of the Central Electric Company, has been appointed manager of the light and power department.

Lynn W. Nones has been appointed Eastern sales manager for the Diamond Power Specialty Corporation, in charge of the Atlantic Coast offices from Boston to Charlotte inclusive. His office is at 90 West Street, New York.

New Advertising Literature

Texas Company, New York, N. Y., in the January issue of *Lubrication* has given much information regarding lubrication practice for electric railways. Articles on methods of reclaiming, handling and storing lubricants are given, together with specific recommendations to eliminate waste and increase efficiency.

Portland Cement Association, Chicago, Ill., has issued a publication entitled "Design and Control of Concrete Mixtures." This booklet describes a method to produce concrete of predetermined strength.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has reprinted the paper "The Development of the Electric Locomotive," originally presented before the meeting of the American Railway Association in Atlantic City in June, 1924. The paper points out the salient facts incident to electric locomotive progress.

General Electric Company, Schenectady, N. Y., has issued bulletin No. 47640.2, devoted to induction, time, over-current relays, types IA-201, IA-202 and IA-206. It describes the four forms of over-current relays, together with the applications of each. Details of construction, lists of available ratings and principles of operation are covered, together with other general information. The bulletin is illustrated by photographs, charts and diagrams.

Crouse-Hinds Company, Syracuse, N. Y., has issued folder No. 21, on junction box condulets with removable hub plates.

Federal Porcelain Company, Carey, Ohio, has issued its condensed catalog of standard electrical porcelain in response to a demand from some of its jobber customers for a small catalog, but one that would at the same time contain complete information on all the types most in demand. The condensed catalog contains list prices, weights, barrel quantities, dimensions and wire carrying capacities on all the items of standard porcelain which are most commonly in demand. The folder is properly punched to fit standard E. S. J. A. salesmen's binders.

PEACOCK

STAFFLESS BRAKES



*Familiar equipment
to the experienced
motorman—*

Inspire motormen's confidence, in the equipment they handle. Confidence, in the time of necessity that their equipment will back them up in actual performance. Many roads recognize the importance of this phase of operation. They have a regular schedule of hand-brake stops on every route. Incidentally it is particularly noticeable that most of these companies are Peacock equipped.

Peacock Brakes are familiar equipment to the experienced motorman.



"The Peacock Staffless"

National Brake Company, Inc.

890 Ellicott Square, Buffalo, N. Y.

Canada:—Lyman Tube & Supply Co., Ltd., Montreal

Bankers and Engineers

Ford, Bacon & Davis Incorporated Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation

Engineers—Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES

New York

Boston

Chicago

THE BEELER ORGANIZATION

ENGINEERS AND CONSULTANTS

Traction-Traffic-Equipment-Power

COORDINATION OF SERVICE—IMPROVED OPERATIONS

INCREASED TRAFFIC—FINANCIAL REPORTS

APPRAISALS—MANAGEMENT

52 Vanderbilt Ave.

New York City

SANDERSON & PORTER ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT and POWER PROPERTIES

CHICAGO

NEW YORK

SAN FRANCISCO

ENGELHARDT W. HOLST

Consulting Engineer

Appraisals, Reports, Rates, Service Investigation,
Studies on Financial and Physical Rehabilitation
Reorganization, Operation, Management

683 Atlantic Ave., Boston, Mass.

ALBERT S. RICHEY ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

JOE R. ONG

Consulting Transportation Engineer

Specializing in Traffic Problems and in Methods to
Improve Service and Increase
Efficiency of Operation

PIQUA, OHIO

STEVENS & WOOD, INC.

Design and Construction of Power Stations
Railroad Electrification, Industrial Plants

REPORTS AND APPRAISALS

Management and Financing of Utilities and Industrials

Mahoning Bank Bldg.
Youngstown, O.

120 Broadway
New York

Dwight P. Robinson & Company

Incorporated

Design and Construction of

Electric Railways, Shops, Power Stations

125 East 46th Street, New York

Chicago Los Angeles Youngstown Montreal Atlanta Philadelphia Rio de Janeiro

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells

Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management Operation Construction

43 Cedar Street, New York City

DAY & ZIMMERMANN, INC.

ENGINEERS

DESIGN - CONSTRUCTION - REPORTS

VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly Pass—Differential Fares
Ride Selling

143 Crary Ave., Mt. Vernon, N. Y.

J. ROWLAND BIBBINS

Engineer—2301 Connecticut Ave., N.W., Washington, D. C.

TRANSPORTATION SURVEYS

Organized Traffic Relief and Transit Development
Co-ordinating Motor Transport, Railroad and City
Plans, Service, Routing, Valuation, Economic Studies

EXPERIENCE IN 20 CITIES

KELLY, COOKE & COMPANY

Engineers

49 BROADWAY
NEW YORK

424 CHESTNUT STREET
PHILADELPHIA

The Most Successful Men in the Electric Railway

Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

C. B. BUCHANAN
PresidentW. H. PRICE, JR.
Sec'y-Treas.JOHN F. LAYNG
Vice-President**BUCHANAN & LAYNG CORPORATION***Engineering and Management, Construction,
Financial Reports, Traffic Surveys
and Equipment Maintenance*BALTIMORE
825 Equitable Bldg.Phone:
Hanover 2142NEW YORK
49 Wall Street**JAMES E. ALLISON & CO.**
Consulting EngineersSpecializing in Utility Rate Cases and
Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.

Bureau of Commercial Economics, Inc.
Industrial EngineersOrganization • Methods • Layout and Facilities
Public and Industrial Relations

72 West Adams Street • CHICAGO

HUMAN ENGINEERING

Railway Audit and Inspection Company, Inc.

Franklin Trust Building, Philadelphia

Boston	New York	} BRANCHES {	Baltimore	Atlanta
New Orleans	Pittsburgh		Chicago	St. Louis

The Most Successful Men in the Electric Railway
Industry read the**ELECTRIC RAILWAY JOURNAL**

Every Week

**Transmission Line and Special Crossing
Structures, Catenary Bridges**

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.

Engineers and Contractors

SYRACUSE, N. Y.

THE P. EDWARD WISH SERVICE50 Church St.
NEW YORKStreet Railway Inspection
DETECTIVES131 State St.
BOSTONWhen writing the advertiser for information or
prices, a mention of the Electric Railway
Journal would be appreciated.

Calculus

made plain and practical
for practical menHere is a plain, clear and thorough book that will give the practical man the ability to make use of the calculus as he needs it in his work. The author says in his introduction: "The subject of calculus cannot be made *easy*, but it can be made *plain*." To this end he has written this book.

Palmer's

**Practical Calculus
for Home Study**

By C. I. Palmer

Armour Institute of Technology

443 pages, pocket size, flexible, 186 illustrations, \$3.00 net, postpaid

This book is for the man with limited mathematical training who has need for a working knowledge of calculus and its practical applications. It shows just what kind of problems can be solved with the aid of calculus and explains thoroughly and clearly how.

You have been waiting for this book

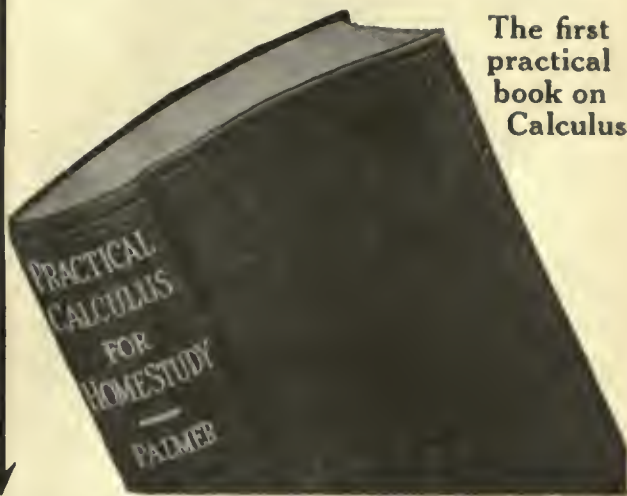
A working knowledge of calculus is of such advantage that hundreds of men have been asking for just such a simple and understandable book as this one. The book avoids involved mathematical terms and phrases. It covers every point plainly. It tells you the many practical uses to which calculus can be put—how you can use it daily—how it can help in your work.

Calculus made plain for you

Calculus has been made thoroughly plain in this book. The fundamentals are repeated over and over again so that once grasped as the book offers them they will remain with you. You will know them. You will know how and when to use them. And you will find the knowledge of the greatest help in your daily work.

Examine a copy for 10 days free

Examine this book free—send the coupon for a copy—see for yourself how plain and understandable the book is. You're not obliged to keep it. See it, surely.

The first
practical
book on
Calculus**Mc Graw - Hill
FREE EXAMINATION COUPON**

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York.

You may send me on 10 days' approval Palmer's Practical Calculus for Home Study, \$3.00 net, postpaid. I agree to remit for the book or to return it postpaid within 10 days of receipt.

Signed

Address

Official Position

Name of Company

(Books sent on approval to retail purchasers in U. S. and Canada only.) E. 2-28-25

The Best Thing Niagara Falls Ever Fell For!



Niagara Falls, N. Y., is but one of many progressive cities that have profited by installing E L R E C O Combination Railway and Lighting Poles. The first noticeable advantage is the marked improvement in the appearance of their streets. The next is the very substantial economy for the street railway company and the illuminating company by their common use of one set of poles. ELRECO Poles support the trolley span-wires as well as the ornamental lighting system. The lighting fixtures can be placed on these poles at just the right height for maximum lighting efficiency. This is another big advantage for the city. Lighting standards are usually too low for the best lighting results.

For the street railway, E L R E C O Tubular Steel Poles mean lowest first cost, lightest weight, least maintenance, easiest possible painting, longest life, greatest possible ability to withstand strains in ALL directions, absolute safety and many other advantages.

We have facts that will knock every objection you can think of COLD. Write for them.

Electric Railway Equipment Co.

Cincinnati, Ohio

New York City, 30 Church Street

ELRECO POLES

These figures tell their own story of MILLER TROLLEY SHOE economy

COMPARISON OF REPLACEMENT COSTS FOR COLLECTION EQUIPMENT FOR THE YEARS 1920 AND 1922		
Year 1920	Used	Cost
Trolley poles 10 ft. 8 in.....	128	\$363.52
Trolley poles 12 ft. 6 in.....	95	351.50
Fixtures:		
Bearings.....	738	287.82
Renewable washers.....	1,561	93.66
Contact rings.....	1,476	291.88
Contact springs.....	1,669	216.97
Trolley harps, type "C".....	200	480.00
Trolley rope.....	1,850	1,377.60
Trolley wheels.....	1,932	3,272.32
Total replacement costs for year 1920.....		\$6,735.27
Year 1922		
Trolley poles 10 ft. 6 in.....	44	\$161.04
Trolley poles 12 ft. 6 in.....	63	285.39
Fixtures:		
Bearings.....	60	23.40
Renewable washers.....	128	3.34
Contact rings.....	96	13.24
Contact springs.....	110	14.30
Trolley harps type "C".....	0	.....
Trolley rope.....	1,309	798.16
Trolley wheels, 6 in.....	621	838.35
Miller trolley shoes.....	159	802.95
Miller contacts.....	1,343	2,377.11
Miller shunts.....	86	57.68
Miller lock washers.....	6	.29
Miller bolts and nuts.....	469	15.01
Miller center pins.....	32	18.24
Total replacement costs for year 1922.....		\$5,408.50
Difference in total costs for the two years in favor of the year 1922.....		\$1,326.77
Cost per M.C.M. for collection equipment, 1920, cent.....		0.751
Cost per M.C.M. for collection equipment, 1922, cent.....		0.642
Note:—All cars were equipped with 6-in trolley wheels during 1922, while during 1920 a large per cent of the cars were equipped with Miller trolley shoes.		
Note:—In the above comparative costs the cost of trolley bases and repairs are not considered.		

—Note these other advantages too!

The Northern Texas Traction Company, (Winners of last year's Coffin Medal), from whose report the above is an excerpt, is but one of many progressive roads which have found specific and substantial economies in the use of Miller Trolley Shoes.

And their experience has but served to confirm the other important Miller advantages:—

1. Less wire wear.
2. More Mileage.
3. No Dewirements.
4. Silent Operation.
5. Steady Current Delivery.

And there's no backing up problem to face. The shape and construction of Miller Trolley Shoes make backing up as simple as going forward.

Miller-ize one route and check up. You'll be convinced.



Miller Trolley Shoe Company
Boston 21, Mass.

In Repairing Begin at

THAT is, with the track. Make the track right and the rolling stock will need very little repairs.

A street car is not a caterpillar tractor. Neither is it a tank.

It is designed and built to run on a resilient, easy-riding, noiseless track—if you want to get your money's worth out of it.

The only kind of track that is permanently this way is the Dayton Resilient Track.

There is a world of proof ready for you—if you will have it.!

The Dayton
Mechanical Tie Co.

707 Commercial Building, Dayton, Ohio

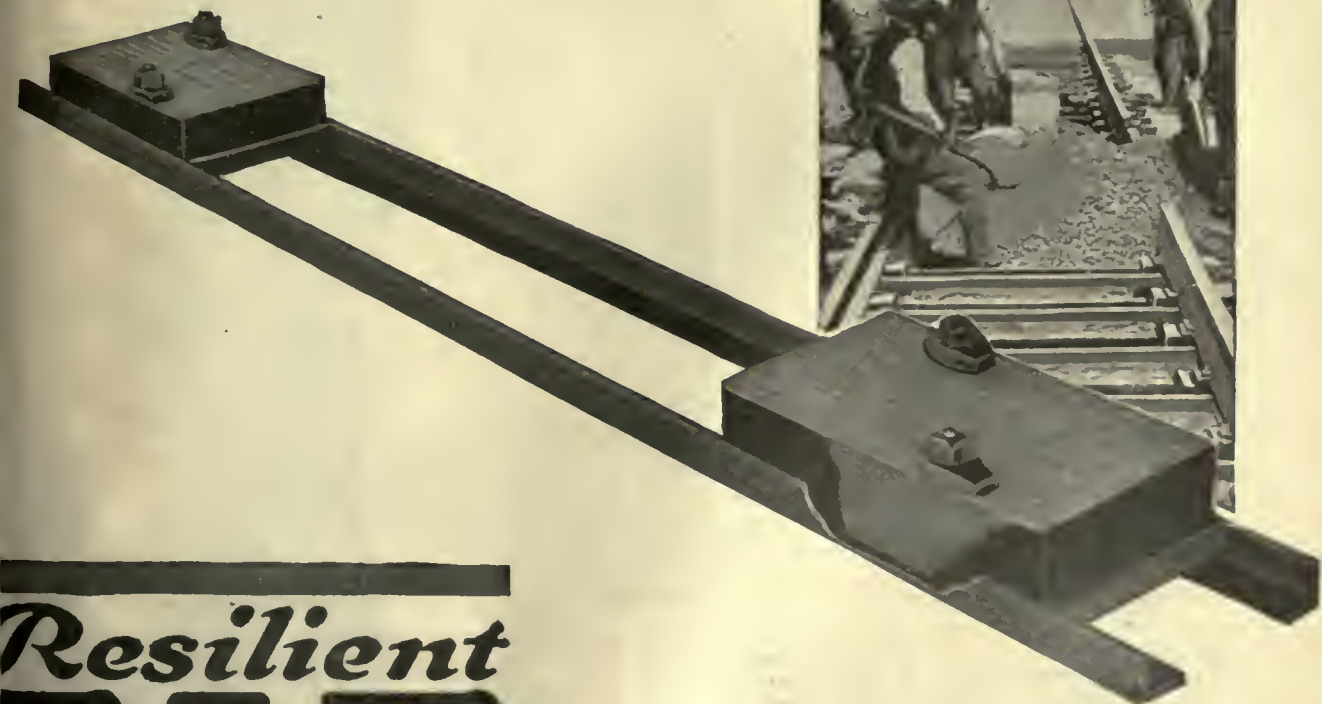
Canadian Representative:

Lyman Tube and Supply Co., Ltd., Montreal, Quebec

DAYTON

Rolling Stock the Beginning

The Dayton Resilient Tie meets all the requirements that the Way Committee of the A. E. R. A. asks for a substitute tie: Resiliency, holding rail to gage, sufficient bearing area, provision for rail renewal, ease of installing, low cost.



**Resilient
TIE**

Puss may
or may not
have nine lives—

BUT—

—it becomes a matter of real importance to you as a practical railway man when month after month evidence piles up that BOYERIZED Parts are outliving ordinary hardened steel not once or twice, *but three to four times.*

Boyerizing does it, gives the tough steel from which these parts are made a glossy, glass-hard, armorplate surface that literally offers no foothold for wear. Get a few of these tough little fellows on the job right now. Let 'em prove their mettle on your own cars.

Buy from this list—
They're BOYERIZED

Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs

Brake Fulcrums
McArthur Turnbuckles
Manganese Brake Heads
Manganese Truck Parts

Center Bearings
Side Bearings
Spring Post Bushings
Spring Posts
Bolster and Transom
Chafing Plates
Bushings
Bronze Bearings

Bemis Car Truck Company

Electric Railway Supplies
Springfield, Mass.

Representatives:

Economy Electric Devices Co., Old Colony Bldg.,
Chicago, Ill.
F. F. Bodier, 903 Monadnock Bldg.,
San Francisco, Cal.

W. F. McKenney, 54 First Street, Portland, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg.,
Los Angeles, Cal.



Now for Thermit

Time has proved the claims, and tests have established the advantages of Thermit Welds. Wherever rail joints have been Thermit-welded their permanence stands as an impregnable bulwark against future repair costs.

With the advent of another new year, and the near approach of Spring track-work, turn to Thermit as the solution of welding problems. The process has been simplified, the cost reduced. For small roads as well as large ones—Thermit offers a means of ending the rail joint problems. The first cost is the last cost—and that cost is lower than ever before.

Watch these pages where we shall show the story of Thermit, and practical illustrations of where and how it is used.

The Pranks of Old Father Time Never Bothered these



For instance:—The weld shown above is one of many which have stood up for over 12 years under heavy traffic on Third Avenue, New York City. Notice the depth to which the rail has been worn without the faintest trace of a "cup."

Advantages of Thermit Welds

Permanence
Perfect elasticity
No maintenance
No loose joints

No cupping
No bonding required
Saves scrapping broken parts
Shop or track



METAL & THERMIT CORPORATION

120 BROADWAY, NEW YORK, N.Y.

PITTSBURGH

CHICAGO

BOSTON

SOUTH SAN FRANCISCO

TORONTO

Announcement

IN order to assure a more intimate and thorough Sales Service to our many customers in the Electric Traction Industry, we have recently added a number of well-known Sales Agencies to represent us in various territories.

This arrangement enables our engineers to render a more thorough and helpful service to the users of UNA Products and Processes.

RAIL WELDING AND BONDING CO., Cleveland, Ohio

Represented by

The Ellcon Company,
50 Church St.,
New York City, N. Y.

Electrical Eng. & Mfg. Co.,
907 Penn Avenue,
Pittsburg, Pa.

P. W. Wood,
1003 Carondelet Bldg.,
New Orleans, La.

Lincoln Electric Company,
136 Johns St.,
Toronto, Ontario, Can.

Railway Track-Work Company,
3132 E. Thompson St.,
Philadelphia, Pa.

R. Roy Holden,
310 So. Michigan Ave.,
Chicago, Ill.

Burton R. Stare Co.,
619 Fourth Ave.,
Seattle, Washington.

Scholey Construction Co.,
137 Victoria St.,
London, England.

Chas. N. Wood Company,
948 Old South Bldg.,
Boston, Mass.

W. L. Rose Equipment Co.,
Planters Bldg.,
St. Louis, Mo.

A. W. Arlin,
519 Delta Bldg.,
Los Angeles, Calif.

T. Y. Inagaky & Co.,
8 Nakadori, Marunouchi,
Tokyo, Japan.

*Rail Joints
Rail Bonds
Dynamotors*

UNA
PRODUCTS

*Welding Processes
Welding Supplies
Welding Rods~*



St. Louis Built-
Ever-Wear **STEEL BODIES**
for Street Railways-

It Reflects the Standard of Its Builders

THIRTY-FIVE years of a consistent "Quality" policy has definitely established the reputation of St. Louis Cars and Equipment.

In back of every St. Louis "Ever-Wear Steel Body" is not only the vast experience in railway body building but a reputation for quality products that is universally recognized.

The illustration shows a 29-passenger Ever-Wear steel body built for the Houston Electric Company. This body will survive the chassis in normal service.

"Ever-Wear" steel bodies are built for railways only, and to conform to the most exacting requirements.

Write us today for further details.

St. Louis Car Company
St. Louis, Mo.



Standard Varnishes and Colors— for transportation service—

For many years the name *Beckwith-Chandler* has stood for the highest quality finishes for steam and electric railway cars. The durability of these products under severe operating and climatic conditions has been proved by the experience of many of the leading railroads of the country.

There are specific Beckwith-Chandler products for every part of the car—exterior, interior, roof, headlining, cane seats, floor and trucks.

We can supply finishes in the flat color and varnish systems, enamel systems or color varnish systems.

NEOLITE—the new Pyroxylin finish is another Beckwith-Chandler development. Make Beckwith-Chandler products your paint shop standard.

BECKWITH-CHANDLER COMPANY

Manufacturers of Highest Grade Varnishes

320 Fifth Avenue, New York, N. Y.

203 Emmett St., Newark, N. J.



1. Passengers are protected from injury when entering and leaving a car by *Pneumatic door operators*.

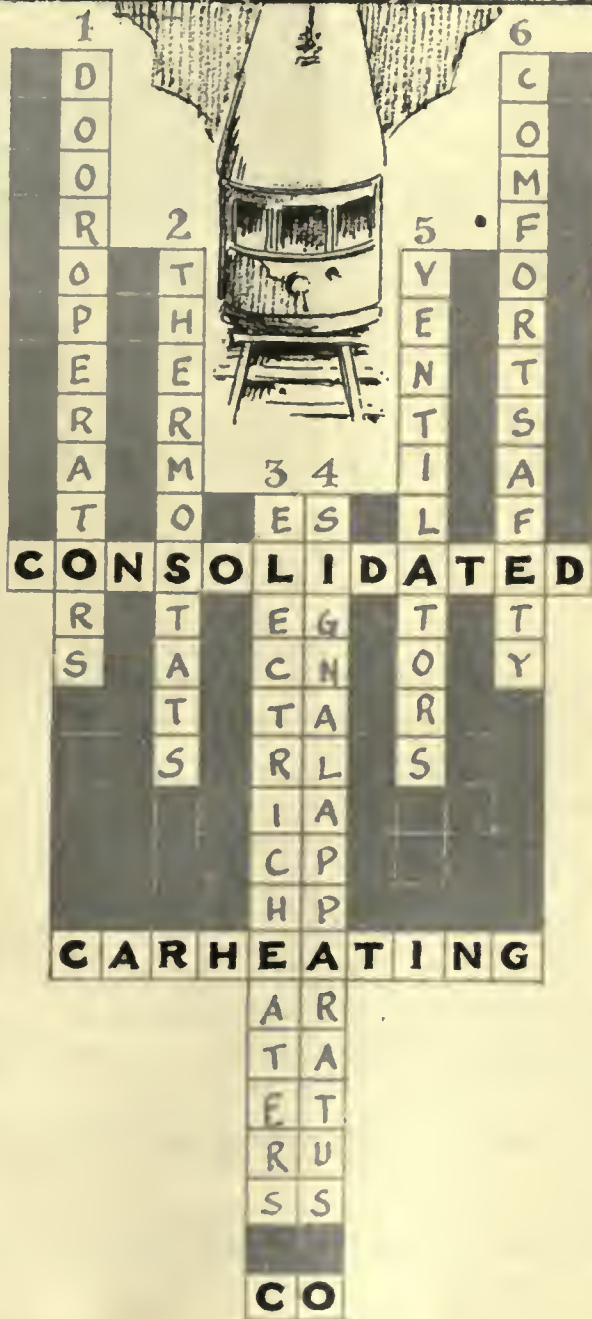
2. A practically constant temperature is maintained by the automatic control by visible *thermostats*.

3. And this heat is supplied by the many suitable types and sizes of *electric heaters*.

4. The motorman is informed when to start and stop his car by a complete and efficient *signal apparatus*.

5. In closely crowded cars, well planned *ventilators* keep the air healthful for passengers.

6. In fact every thing for the *comfort and safety* of operator and patron is made by this Company.

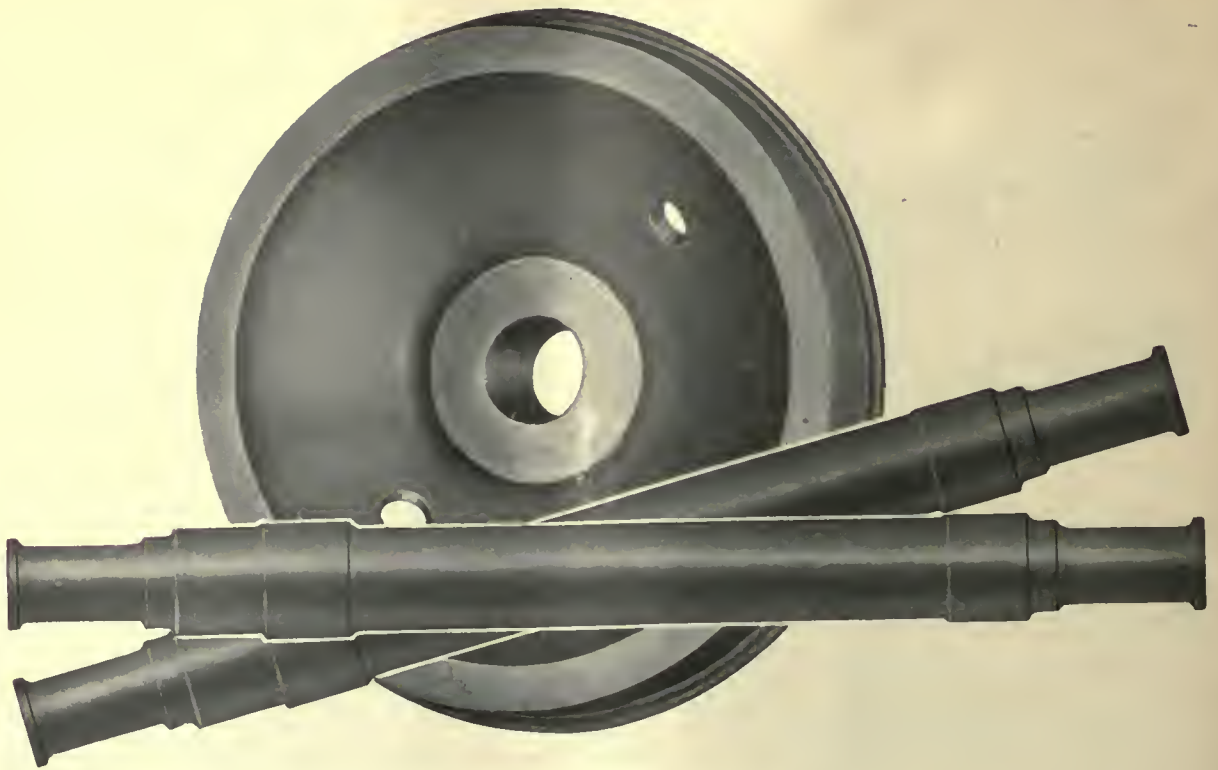


CONSOLIDATED CAR HEATING COMPANY

ALBANY, N. Y.

NEW YORK

CHICAGO



Cambria Rolled Steel Car Wheels and Forged Axles

CAMBRIA ROLLED STEEL CAR WHEELS for Electric Service are made at the Johnstown Plant of Bethlehem Steel Company by a combination rolling and forging process. This process thoroughly works the steel and gives an exceptional refinement in structure which does not readily develop flat spots. For this reason Cambria Rolled Steel Car Wheels will give you the longest service at lowest cost.

CAMBRIA FORGED AXLES for Street, Interurban, Subway and Elevated cars, and Armature Shafts for Electric Service are made to meet any reasonable specification. They can be furnished treated or untreated; solid or hollow bored; smooth forged only; rough turned all over; rough turned on journals and wheel seats; or finished turned on journals and wheel seats.

We will also mount wheels on the axles if so desired.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Sales Offices

New York
Boston
Philadelphia

Baltimore
Washington
Atlanta
St. Louis

Buffalo
Pittsburgh
Cleveland
San Francisco

Detroit
Chicago
Cincinnati

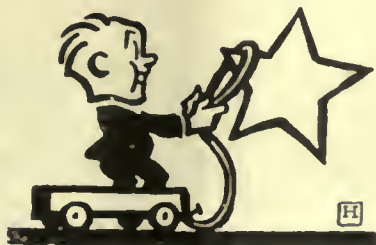
Bethlehem Steel Export Corporation, 25 Broadway, New York City
Sole Exporter of Our Commercial Products

We have a large stock of wheels in standard sizes and can supply on short notice:

Wheels for City and Suburban Service from 21 to 36 inches diameter with rims $3\frac{1}{2}$ inches to $4\frac{1}{8}$ inches wide and $1\frac{1}{2}$ to $2\frac{1}{2}$ inches thick.

Wheels for Interurban Service from 22 to 37 inches diameter with rims $3\frac{1}{2}$ inches to $4\frac{1}{8}$ inches wide and $1\frac{1}{2}$ to 3 inches thick.

BETHLEHEM



This is what Wise Companies do!

They hitch their cars to the Texaco Star. And their power plants, too, for that matter.

The Texas Company is lubricating completely scores of leading electric street railway lines. These lines have found that Texaco Lubricants have given them the satisfaction of reduced maintenance and better service, the satisfaction of smoother operation with lower final cost.

When we say Texaco products are completely lubricating these roads, we mean they are doing their efficient work in every part of the power plant and on every part of every car.

If your company has not learned why other roads are using *Texaco exclusively*, you should call on a Texaco engineer and go into the matter. We pride ourselves in being "Lubricating Specialists to the Electric Street Railway Field."

There is a TEXACO LUBRICANT for Every Purpose



THE TEXAS COMPANY
DEPT. R-J · 17 BATTERY PLACE · NEW YORK CITY
HOUSTON · CHICAGO · NEW YORK
OFFICES IN PRINCIPAL CITIES





Save the motors

with

Nuttall

Standard Helical Gears



First, second—fifth notch on the controller, and a shock goes through the car as the motors gather speed!

That's where the trouble begins, that shock of acceleration that is inevitable with spur gearing. It springs Bolts, strains bearings, loosens insulation, cuts gear life and motor life, and piles up maintenance.

Not only the motors suffer; body work suffers too, and soon begins to creak, soon need "touching up."

Nuttall BP Helical Gears will stop this profit leak. The meshing of the teeth is like the turning of a screw—smooth, vibrationless, noiseless, shockless. There is no grinding and no chattering.

The secret lies in the $7\frac{1}{2}$ deg. Helix Angle; the long and short Addendum tooth; and the famous Nuttall BP Heat Treating Process.

The West Penn Railways have one set of Nuttall Helicals among the many they use with a 500,000 mile record to its credit. Practically every traction property in the country is using helical gears.

We'll be glad to co-operate in *proving* their economy on your cars. Consult us.

Write for our Helical Gear Book

R.D. NUTTALL COMPANY
PITTSBURGH  PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.





Steel Wheels Without Maintenance

Wheel-turning is a fast growing maintenance item.

Every addition of "multiple-wear" steel wheels increases the shop burden.

If steel wheels other than Davis Wheels go under your cars today you are faced with the necessity of conditioning their contours. Shop equipment must be bought and skilled mechanics detailed to the work. This cuts into funds for improvements and increases maintenance costs.

Davis "One-Wear" Steel Wheels eliminate this expense. They make a big mileage without repeated re-turnings.

The Davis "One-Wear" Steel Wheel is made of special steel compressed by centrifugal action while the metal is molten. It is subjected to scientific heat treatment, resulting in great strength and resistance to wear.

Ask about the properties who are using Davis Steel Wheels

AMERICAN STEEL FOUNDRIES

NEW YORK

CHICAGO

ST. LOUIS

Let Experts solve your Lubricating Problems

EVERY industrial plant has its own lubricating problems and until their solution is found the industry can not operate on the basis of highest efficiency.

Lubricants which are ideal for use on one machine may be quite unsuited as a lubricant for another. The lubricating needs of each machine must be completely and properly provided for, if it is to give maximum service and satisfaction.

To do this, the lubrication requirements of each machine must be fully understood. Consideration must be given to the type of machine, the speed at which it operates, temperatures developed or encountered and many other factors and conditions.

Standard Oils and Greases

include every lubricant that industry requires. By selecting lubricants of exactly the right quality and characteristics, every bearing and moving part may be made to function with the highest efficiency.

To produce such lubricants requires both technical knowledge and refining skill. To see that lubricants of proper grade are supplied in proper manner and proper quantity calls for technical knowledge and practical experience.

The Standard Oil Company (Indiana) has spared no expense to produce the finest of lubricants. It maintains, too, a staff of engineers whose work it is to serve the industries of the middle west by seeing that each lubricant is used in the proper place. Through this service the middle west industries have saved many thousands of dollars.

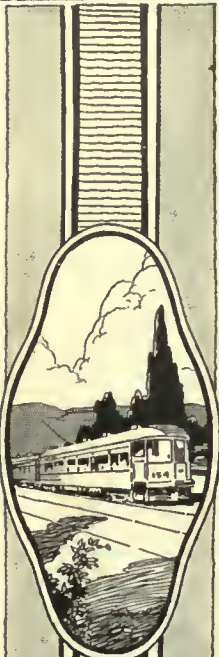
You, too, can save money by having one of these experts make a lubricating survey of your plant. You need only write, phone or wire us. The service costs you nothing and places you under no obligation to us.

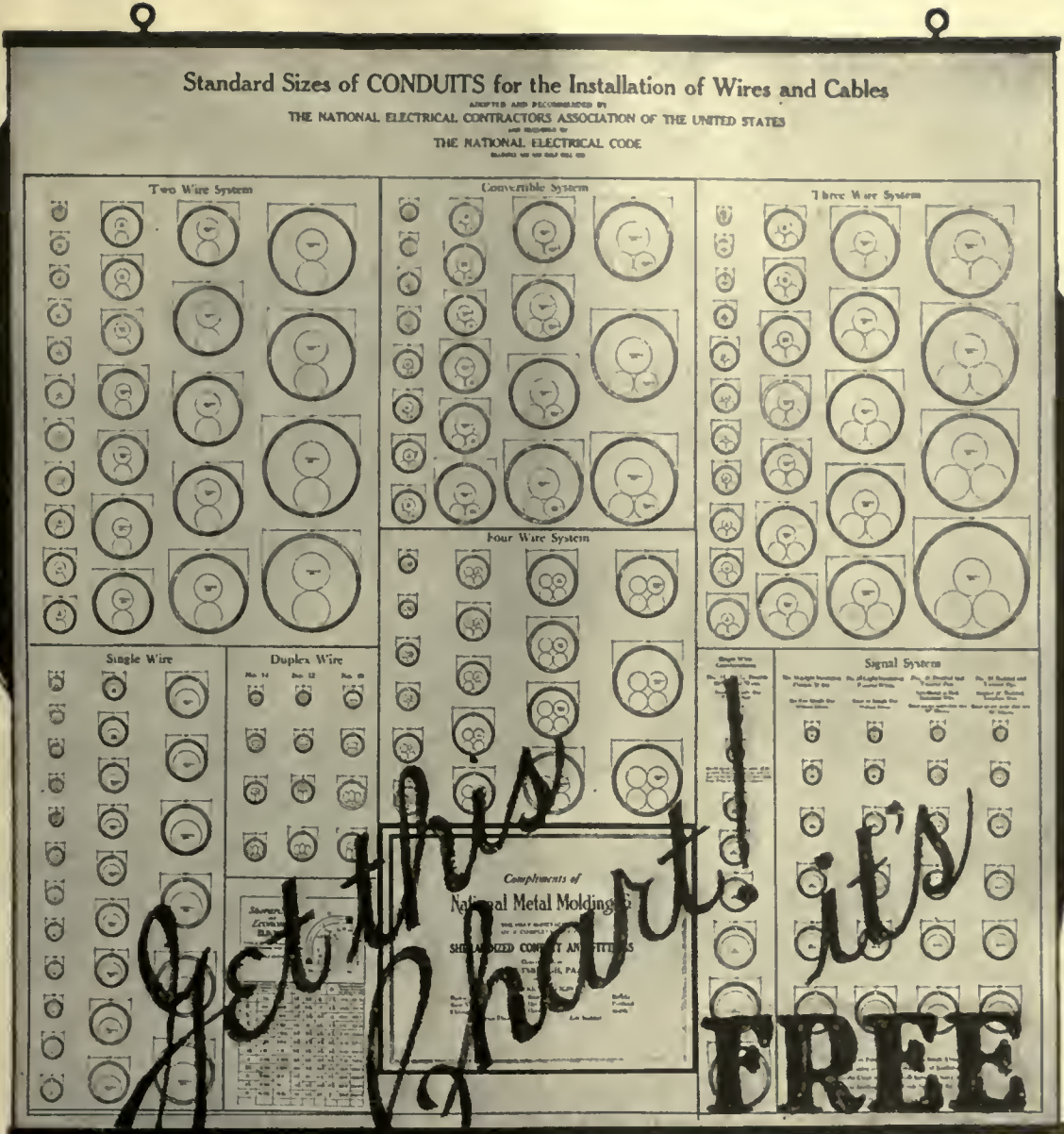
STANDARD OIL COMPANY

(INDIANA)

General Offices: 910 S. Michigan Avenue, Chicago, Illinois

ILLINOIS	INDIANA	IOWA	MICHIGAN	WISCONSIN	MISSOURI
Chicago	Evansville	Davenport	Detroit	La Crosse	Kansas City
Decatur	Indianapolis	Des Moines	Grand Rapids	Milwaukee	St. Joseph
Joliet	South Bend	Mason City	Saginaw	MINNESOTA	St. Louis
Peoria	KANSAS	Sioux City	N. DAKOTA	Duluth	
Quincy	Wichita	S. DAKOTA	Fargo	Mankato	
		Huron	Minot	Minneapolis	





WHAT size of conduit? What about elbows? Questions instantly and authoritatively settled for any job where rigid conduit is to be installed.

This Chart hangs on the wall as handy as a calendar—and as necessary when wiring must be figured.

It is a quiet reminder of *Sherarduct*—the Rigid Conduit. The Chart is free, and so intensely practical you will regularly use it.

National Metal Molding Company



WORLD'S LARGEST PRODUCERS OF ELECTRICAL CONDUITS AND FITTINGS

1559 Fulton Building, Pittsburgh, Pa.

Represented in All Principal Cities



10

Sherarduct

The Rigid Conduit That Bends



Make certain on every wiring job with this free Chart. Just slip this coupon in the mail now; that's all you need to do.

MAIL TODAY

National Metal Molding Company
Pittsburgh, Pa.

Please send free Chart of Standard Sizes of Conduits.

Name

Firm

Address

TEAR OFF



Elevated, street and subway lines make the Broadway, 34th Street and Sixth Ave. intersection in New York City, a very congested one.

Columbia products are used on many of these cars with ever increasing satisfaction to the operators.

The

COLUMBIA MACHINE WORKS

and Malleable Iron Company

3303 Atlantic Avenue

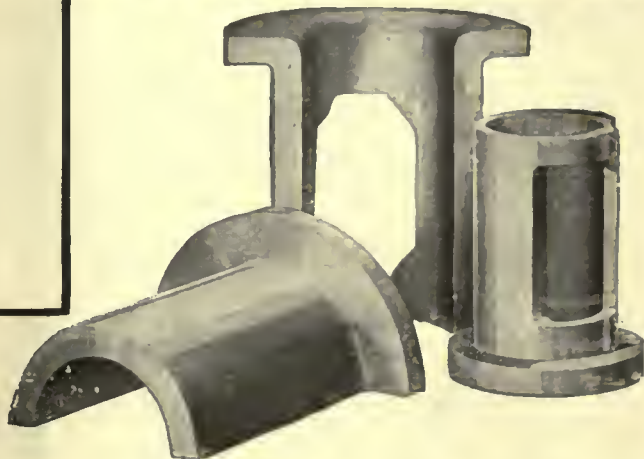
Brooklyn, N. Y.





Quality Service Economy Security

M-J Armature Babbitt Metal
compounded of new tin, copper, antimony
and metallic nickel—no lead used. Insures
lowest net cost per mile of operation.



"Tiger" Bronze Axles and Armature Bearings

The exceptional toughness and anti-frictional
qualities of "Tiger" Bronze insures great
strength and a very slow and even rate of
wear. The result is perfect bearing align-
ment and greater mileage. "Tiger" Bronze
will save its cost many times over every year.



M-J Lubricated and V. K. Oilless Trolley Wheels and Non-Arcing Harps

The metal used is exceedingly tough, yet does not grind
away the metal of the wire. Perfect lubrication is accom-
plished automatically. Properly balanced and mechan-
ically perfect in finish. Greater mileage assured. Lowest
in ultimate cost and highest in net efficiency.

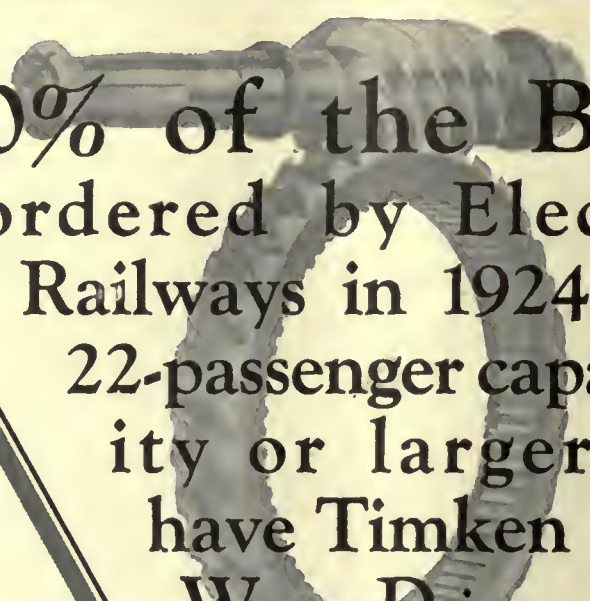


Those responsible for the purchasing of street car
equipment can come to More-Jones for certain of
their requirements with a full knowledge that here
is equipment that represents the utmost in service
value. Economy is a very definite result and is real-
ized over a period of years. Start securing it by let-
ting More-Jones furnish your next requirements.

MORE-JONES BRASS & METAL CO.
ST. LOUIS, MISSOURI

MORE-JONES QUALITY PRODUCTS

TIMKEN



70% of the Buses
ordered by Electric
Railways in 1924, of
22-passenger capac-
ity or larger,
have Timken
Worm-Drive
Axles

The Timken-Detroit
Axle Company
Detroit, Michigan



AXLES

Of the 19 railway Co's

in the U.S.A.

operating 1000 or more cars,

13

regularly use "Tool Steel" gears & pinions.

68 %

Tool Steel Quality T. S. Q. Tool Steel Quality

Tool Steel Gear and Pinion Co.
Cincinnati, Ohio



Collier Service

A nation-wide
organization
building and
sustaining car
card advertising
space values



Barron G. Collier, Inc.

Candler Bldg.
New York



Hyatt bearings in the journal boxes of this car are effecting a 20% power saving for the Citizens Traction Company, Oil City, Pa.



20% Saved Is 20% Earned

LEADING engineers in the electric railway field recognize that Hyatt equipped journal boxes on electric cars effect a power saving of at least 20% when compared with plain bearing equipment.

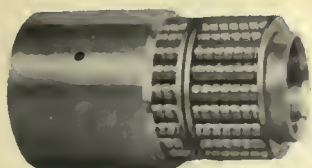
Mr. John A. Dewhurst, of Day & Zimmerman, Inc., in referring to the first completely Hyatt equipped car of the Citizens Traction Company, says:

"We made this installation principally to determine what saving in power would result, and the earliest tests indicate a 20 per cent saving. It is further reported that the Hyatt roller bearings have apparently

brought about an elimination of noise."

Not only is a 20% power saving possible through the use of Hyatt bearings but the elimination of plain bearing friction means lighter loads on the motors and less wear and tear on the other parts of the running gear. Easier and quicker acceleration shortens the schedule time over the complete run without increasing maximum speeds.

A power saving of 20% and substantial savings in lubrication and maintenance costs are worth looking into. May one of our electric railway specialists give you complete information?



HYATT ROLLER BEARING COMPANY
NEWARK, NEW JERSEY

*The Magnet
that pulls
your share of
this business*



\$342,000,000 will be spent by electric railway companies during 1925 for new equipment, materials and supplies.

The "modernization program" is behind this tremendous expenditure. To keep pace with progress they must cultivate better public relations and this necessitates up-to-date maintenance.

Modern maintenance practices, methods and equipment will be featured in the March 21st issue of **ELECTRIC RAILWAY JOURNAL**.

The Annual Maintenance Number

This issue will blanket 99% of the buying power of the field. So that your instructions may receive the most careful attention, make immediate reservation for space and copy service.

Electric Railway Journal

Tenth Avenue at 36th Street, New York, N. Y.

**ANNUAL
Maintenance
Number**

**MARCH
21st**

An H-W Reed Motor Coach
Seat of New Design



WHERE seating space must be conserved this new Heywood-Wakefield 49-P Luxureed is cordially welcomed by motor coach builders.

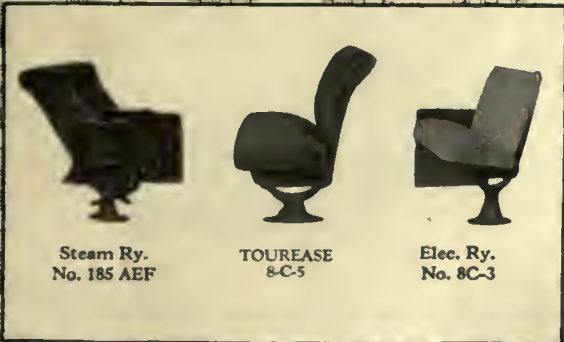
Short arms, properly sloped backs and curved seat-fronts allow closer placing with plenty of knee-room and ample passage space for passengers.

Open space under seat provides convenient storage for luggage.

These Luxureed seats have all the built-in comfort as well as the sturdiness so essential for motor coach touring service.

Heywood-Wakefield bus seating experts, backed by our 99 years of seat-building experience, are at your service without charge.

Address the most convenient of these
HEYWOOD-WAKEFIELD SALES OFFICES
HEYWOOD-WAKEFIELD COMPANY
1359 Railway Exchange Bldg., Chicago, Ill.
HERBERT C. COOK
Hobart Bldg., San Francisco, Cal.
HEYWOOD-WAKEFIELD COMPANY
516 W. 34th St., New York
F. N. GRIGG
630 Louisiana Ave., Washington, D. C.
THE G. F. COTTER SUPPLY CO., Houston, Tex.
THE RAILWAY AND POWER ENGINEERING CORP
Montreal and Toronto, Canada



Heywood-Wakefield
REG. U.S. PAT. OFF.



Something New in
Portable Compressors

We want Electric Railway men to know this new Portable Compressor, which is so well adapted to construction and repair work.

Sullivan Balanced "V"
220 cu. ft. capacity

It's a 4-cylinder compressor, with the cylinders set in pairs, at 90°, on the same crank shaft.

Cylinders are 5½ x 5 in., single acting, equipped with automatic, wide opening Wafer valves. This design secures compactness and excellent balance, further aided by a heavy flywheel inside the compressor casing.

Vibration is almost imperceptible at full speed (800 R.P.M.). All moving parts are fully enclosed and are splash oiled. Drive is by positive interlocking external and internal gear clutch from Buda 4-cylinder, 4-cycle engine, of liberal surplus capacity. Outfit weighs 5360 lb. empty. H.P. 42. Capacity two to three Rotator Rock Drills, three to four Concrete Breakers, or Tampers, seven to nine Riveters or Clay Spaders, etc.

Ask for new catalog 3277N.

SULLIVAN
MACHINERY COMPANY
150 S. Michigan Ave. Chicago

New Cars for Los Angeles have **PLYMETL**



One of 60 cars built in the shops of the Los Angeles Railway with PLYMETL side panels.

Side Panels

Where heavy steel plates are replaced with PLYMETL girder panels, the street car of today and tomorrow will be hundreds of pounds lighter, have better riding qualities, improved appearance and greatly reduced operating and maintenance costs. The insulating value of PLYMETL girder panels is so great that no interior side linings are necessary. They offer increased rigidity to the car with reduced weight.

HASKELITE

When used for roofs, headlinings, bulkheads and interior trim, reduces weight, factory installation and operating and maintenance expense and at the same time actually increases the strength of the car considerably.

Send for free booklet of Blue Prints and Engineering Data

HASKELITE MANUFACTURING CORPORATION, 133 West Washington Street, CHICAGO, ILL.

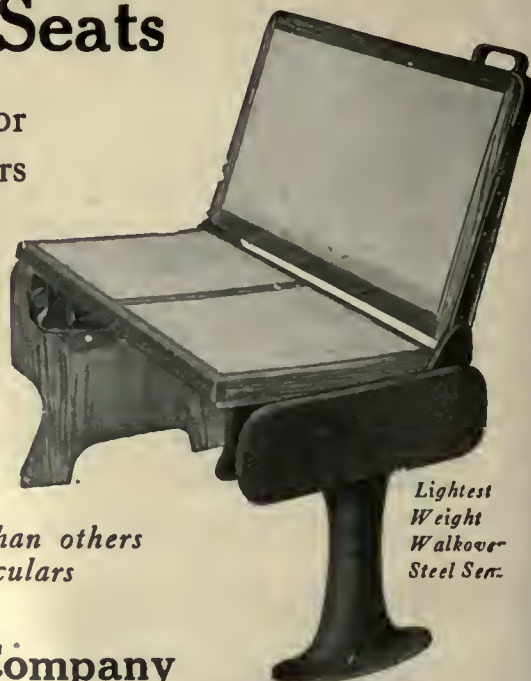
Your Passengers Will Enjoy Their Ride On Hale-Kilburn Seats

Especially Designed for
One Man Safety Cars

**Lightest
Strongest
Simplest
Neatest**



*Lightest
Weight
Stationary
Steel Seat*



*Lightest
Weight
Walkover
Steel Seat*

*No higher in price than others
Write for particulars*

Hale-Kilburn Company
PHILADELPHIA

New York
30 Church St.

Chicago
McCormick Bldg.

Richmond
Mutual Bldg.

Atlanta
Candler Bldg.

San Francisco
903 Monadnock Bldg.

Los Angeles
320 S. Pedro St.



Reg. U. S. Pat. Office
Incandescent Lamp Cord

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE
AND CABLE

PAPER INSULATED
UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 111 W. Adams;
Cincinnati, Traction Bldg.; New York, 100 E. 43rd St.

We are prepared

to handle any high grade proposition where
VARNISHED CAMBRIC
Wires and Cables
are required.

When using *quality* Wires and Cables use *quality* Tapes.
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes.

THE OKONITE CO., Passaic, N. J.
Incorporated 1884



TRADE MARK

SALES OFFICES: New York, Chicago,
Pittsburgh, St. Louis, Atlanta, Birmingham, San Francisco

F. D. Lawrence Electric Co., Cincinnati, O.; Novelty Electric Co., Philadelphia, Pa.; Fettingell-Andrews Co., Boston, Mass.

Canadian Representatives: Engineering Materials Limited, Montreal.

Arc Weld Rail Bonds

AND ALL OTHER TYPES

Descriptive Catalogue Furnished

American Steel & Wire Company

Chicago

New York

Boston

Cleveland

Pittsburgh

Denver

U. S. Steel Products Co.

San Francisco

Los Angeles

Portland

Seattle

TRADE



MARK

For dependable Line Material that
will give you maximum service use

ANDERSON

Send for Latest Quotations

Main Office and Factory, Boston, Mass.

Chapman Automatic Signals

Charles N. Wood Co., Boston



ROEBLING

WELDING CABLE

ELECTRICAL WIRES and CABLES

John A. Roebling's Sons Company, Trenton, N. J.

STANDARD

Wires, Cables, Cable Accessories

Superior quality, economical prices

Standard Underground Cable Co.

Boston Philadelphia Pittsburgh Detroit

New York Washington Chicago St. Louis

PEIRCE

Railway Feeder Pins

A strong Forged Steel Pin designed for heavy duty.
Their low cost permits their use over the entire
system.

HUBBARD & COMPANY

PITTSBURGH

CHICAGO

ANACONDA TROLLEY WIRE

ANACONDA COPPER

MINING COMPANY

General Building, Chicago, Ill.

THE AMERICAN

BRASS COMPANY

General Office, Walsbury, C.

*Only reliable products
can be continuously
advertised*

AUTOMATIC SIGNALS
Highway Crossing Bells
Headway Recorders
Flasher Relays

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.





ACME WIRE

PRODUCTS

Specify Acme Varnished Cambrics—they stand up under the most exacting demands of all electrical work.

ACME MAGNET WIRE

"Enamelite"—Plain enameled copper wire

"Cottonite"—Cotton-covered "Enamelite"

"Silkenite"—Silk-covered "Enamelite"

Magnet Wire—Cotton or silk, single or double

ACME COIL WINDINGS

Field Coils, Meter Coils, Ignition Coils, Windings for Audio and Radio Frequency Transformers.

ACME VARNISHED INSULATIONS

Varnished Cambrics—

Black and yellow

Varnished Silks and Tapes—

For every requirement

Varnished Papers—

Black and yellow

Varnished Tubing—

"Spaghetti", all sizes, 5 colors

"Celatsite" Wire—

Tinned, spaghetti-covered wire for radio sets; 5 colors

Insulating Varnishes

Catalog sent Engineers and Executives

THE ACME WIRE COMPANY

Main Office and Plant, New Haven, Conn.

New York Cleveland Chicago

52 Vanderbilt Ave. Guardian Building 53 W. Jackson Blvd.



The Principle that established solderless connectors as good engineering.

The more contact surface you get in a connection—the better the joint.

Because the tapered sleeves of the Dossert Connector gave engineers a means for securing large contact area held permanently tight—the solderless connector idea met with favor.

Today it is standard practice.

Write for the Dossert Catalog.

Dossert & Company, New York

242 West 41st Street

H. R. LOGAN, President

DOSSERT

Solderless Connectors

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa.

Sales Offices:

Atlanta Chicago Cleveland New York

Philadelphia Pittsburgh

Pacific Coast Representative:

United States Steel Products Company

Los Angeles Portland San Francisco Seattle

Export Representative:

United States Steel Products Company, New York, N. Y.



Special Track Work of every description

THE BUDA COMPANY

Harvey (Suburb) Illinois

SPECIALISTS

in the

**Design and Manufacture
of**

**Standard—Insulated—and
Compromise Rail Joints**

The Rail Joint Company

61 Broadway, New York City

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE
CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of
Water Tube Boilers
of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Tracton Building
ATLANTA, Candler Building
PHOENIX, Aatz, Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building



WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguilar 104
SAN JUAN, PORTO RICO, Royal Bank Building

B. A. HEGEMAN, Jr., President
H. A. HEGEMAN, Vice-Pres. and Treas.
W. C. PETERS, Manager Sales and Engineering

C. C. CASTLE, First Vice-President

P. T. SARGENT, Secretary

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and
Change Maker
The Aluminum Field Coils
Walter Tractor Snow Plows
Cutler-Hammer Electric
Heaters
Pittsburgh Forge & Iron
Co.'s Products
Genesco Paint Oils
E. Z. Car Control Corpora-
tion's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s
Single and Double Deck
Buses

Economy Electric Devices
Co.'s Power Saving and
Inspection Meters
Anglo-American Varnish Co.
Varnishes, Enamels, etc.
Gilmer Multiple Safety Step
Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co.
Springs
Turnstile Car Corporation's
Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

'CARNEGIE'
for
**WHEELS
AXLES
RAILS
CROSS TIES**



Carnegie Steel Company
PITTSBURGH, PENNA.

Play for safety—

**plus resiliency—
plus long life**

By specifying

FORT PITT SPRINGS

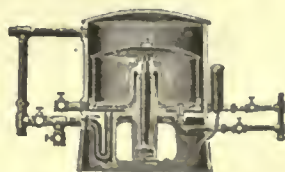
**FORT PITT SPRING &
MFG. CO.
Pittsburgh, Pa.**



Turbine driven Reclaiming Machine

saves

Oil and Wiping Waste



The Oil & Waste Saving Machine Co.

1509 Real Estate Trust Bldg., Philadelphia, Pa.

Dept. D.

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

ALLIS-CHALMERS
MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines,
Condensers, Gas and Oil Engines, Air Compressors,
Air Brakes

ECONOMIZERS

reduce fuel costs by making
use of waste exhaust gases to
preheat the boiler feed.
Patented construction proven
by 20 years of service.

FOSTER

SUPERHEATERS

improve engine, turbine and
boiler economy by enabling a
given amount of steam to do
more work. Over 10,000 in-
stallations in stationary power
plants.

POWER SPECIALTY CO.,

Boston, Phila., Pitts., Detroit, Kans. City, Chicago,
San Fran., Los Angeles, Boulder, Dallas, London

111 Broadway, NEW YORK



N-L Type "AA"
Bus Ventilator

"Superior Ventilation"

Perfect ventilation of cars and buses pays—in cold, cash profits. In cold weather, passengers like warm air—if it is fresh. But next to bad air, they dislike drafts.

N-L Ventilators give a complete change of air many times an hour, without drafts. No snow, rain or dust can get in. Now used by leading street railways and bus body builders.



"Superior Ventilation" describes them fully. Write for a copy.

The Nichols-Lintern Co.

7960 Lorain Ave. Cleveland, Ohio
Canadian Representative: Railway & Power Eng. Corp., Ltd.,
133 Easter Ave., Toronto



OHMER FARE REGISTERS

They indicate and record the exact amount of each transaction. They place the sale of transportation on a strictly business basis.

We manufacture Indicating and Recording Fare Registers, Receipt Issuing Taximeters, and Fare Boxes.

OHMER FARE REGISTER CO.

Dayton, Ohio



The Zone System of Fares
is Successfully Collected
with the Aid of

CLEVELAND FARE BOXES

Let Us Give You Particulars

The Cleveland Fare Box Co.
Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd.,
Preston, Ont.

Coin Counting and Sorting Machines. Change Carriers



Type R-11
Double Register

International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for
HEEREN ENAMEL BADGES.

The International Register Co.

15 South Throop Street, Chicago, Illinois



ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed.
Up-to-date and economical.

Alumino-Thermic Corp., Roselle Park, N. J.



Adapted to all
types of rails
and paving.

GODWIN Steel Paving Guards

Proven by service to economically prevent
seepage and disintegration of street railway
paving.

Write for Illustrated Catalog No. 20

W. S. GODWIN CO., Inc.
Race and McComas Sts., Baltimore, Md.

RAIL BONDS

Brazed—Arc Weld

Portable Arc Welding & Bonding Outfits

THE ELECTRIC RAILWAY IMPROVEMENT CO.

Cleveland, Ohio



PAXSON Switch and Frog BROOMS

Wire or Rattan

J. W. PAXSON CO.
Philadelphia, Pa.

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

**COST MORE PER BRUSH
COST LESS PER CAR MILE**

W. J. Jeandron

345 Madison Avenue, New York

Pittsburgh Office: 634 Wabash Bldg.

Chicago Office: 1657 Monadnock Block

San Francisco Office: 525 Market Street

**Canadian Distributors: Lyman Tube & Supply Co., Ltd.,
Montreal and Toronto**

BRAKE SHOES

AERA Standards Brake Heads



Diamond "S" Steel Back and Lug Shoes
best for all equipment.

Manufactured and sold under U. S.
Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York

332 So. Michigan Ave., Chicago

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life **WITHOUT INJURY TO THE WIRE**. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the **LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD**.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

Griffin Wheel Company

410 North Michigan Ave.
Chicago, Ill.

GRIFFIN F. C. S. WHEELS

**For Street and Interurban
Railways**

FOUNDRIES:

**Chicago
Detroit
Denver**

**Boston
Kansas City
Council Bluffs**

**St. Paul
Los Angeles
Tacoma**



We make a specialty of
**ELECTRIC RAILWAY
LUBRICATION**

We solicit a test of TULC
on your equipment

The Universal Lubricating Co.

Cleveland, Ohio

**Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City**



The "Ideal" Trolley Wheel *'For Electric Railway and Crane Service*

Our new type, low carbon steel flanges are softer than the overhead, thereby conserving it.

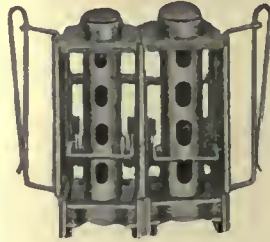
Perfect balance allows the Ideal to follow the wire more closely and with less spring tension.

The contact ring and hub is made of pure new copper with a small amount of tin, giving a low electrical resistance.

EDWARD P. SHARP
L. E. HARMON, Prop.
308-14 Terrace
Buffalo, N. Y.

Sales Representatives:
R. D. NUTTALL CO.
Pittsburgh, Pa.
NATIONAL BRAKE CO., Inc.
Buffalo, N. Y.

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coils, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



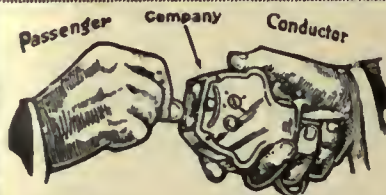
No.
478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

100 New Users in the Last Nine Months KASS SAFETY TREADS

HIGH
in efficiency and lasting qualities
LOW

in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago



Direct Automatic Registration By the Passengers

**Rooke Automatic
Register Co.**
Providence, R. I.



Gets Every Fare **PEREY TURNSTILES or PASSIMETERS**

Use them in your Prepayment Areas and Street Curs

Perey Manufacturing Co., Inc.
101 Park Avenue, New York City

SEVEN WORKS
RAMAPO-AJAX-ELIOT

HILLBURN, NEW YORK
NIAGARA FALLS, N.Y.
CHICAGO, ILLINOIS
EAST ST. LOUIS, ILL.
FUEBLO, COLORADO
SUIPERIOR, WISCONSIN
NIAGARA FALLS, ONT.
CANADA

Ramapo Ajax Corporation

**RAMAPO AUTOMATIC
RETURN SWITCH STANDS
FOR PASSING SIDINGS
TEE RAIL SPECIAL WORK
MANGANESE CONSTRUCTION**

SALES OFFICES AT ALL WORKS
Main Office, HILLBURN, N.Y.

RAILWAY UTILITY COMPANY

CAR COMFORT WITH HEATERS
UTILITY REGULATORS
VENTILATORS

111-151 West 22d St.
Chicago, Ill.

Write for
Catalogue

1328 Broadway
New York, N. Y.



Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.



Electrical Insulation and Headlinings
THE PANELYTE COMPANY, Trenton, N. J.

PROVIDENCE H-B FENDERS LIFE GUARDS

The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

HORNE & EBLING CORPORATION

50 CHURCH ST., NEW YORK, N. Y.

Brass Hardware
For Cars and Buses

Motor and Controller
Parts



Sterling Trolley Bases
and Brakes

Mall. Iron and Brass
Castings

NEW and RELAYING RAILS

1 TON OR 1000



NEW YORK - JERSEY CITY - PHILADELPHIA - HAMILTON, O.

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD.

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.
Positions Vacant and all other classifications, 8 cents a word, minimum charge \$2.00.
Proposals, 40 cents a line an insertion.

INFORMATION

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.
Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH

1 to 3 inches \$4.50 an inch
4 to 7 inches 4.00 an inch
8 to 14 inches 4.10 an inch
Rates for larger sizes, or yearly rates on request.
In advertising inch is measured vertically in one column, 2 columns—30 inches—4 a page.

E. J.

POSITIONS VACANT

SPECIAL track work draftsmen wanted preference given men having had experience with special track work manufacturer, but will consider one or two junior draftsmen familiar with trigonometry. State age, experience and salary in first letter. P-774, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

YOUNG engineer wanted with experience on street railway track maintenance and construction; college man preferred, for position in sales department of rapidly growing industry. Give full particulars as to education, experience and salary expected. P-792, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

ACCOUNTING executive, railway, electric and gas utilities, now employed, seeks change; can produce results. PW-780, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

CAR painter wants position; letterer, stripper and varnisher. Can do anything to be done on a car in the line of painting; an all around man. PW-791, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

GENERAL repairman, 12 years' experience on armature winding, and electric equipment, on city and Interurban equipment. PW-779, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

TRAFFIC manager, competent to handle traffic promotion and public relations work, including advertising for railway company operating city and Interurban rail and bus service. At present assistant with such company. Particularly valuable to company modernizing or expanding its service. Good business sense and practical knowledge of rail and bus operation. PW-790, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SALESMAN WANTED

Side Line

Salesman who is already calling on, or in touch with street railways in the eastern part of the United States to take on a new article for sale, paying a good commission for which there is a great demand, and very little competition. SW-784, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

Keep your Eye
on the
Searchlight
and your
Advertisements in it

BARGAIN

68—WH-93-A MOTORS

Splendid Condition

Complete \$150 Each

Transit Equipment Company

Cars—Motors

501 Fifth Avenue, New York

WANTED

**Orders for Oak, Car Stock,
Cross Ties, Switch Ties, Timber**

Have four mills in operation. A good stand of timber. Grades guaranteed. Prices right. Let's get acquainted.

ENARC LUMBER MFG. CO.

411 A. O. U. W. Bldg., Little Rock, Ark.

**SEARCHLIGHT
SERVICE
SECURES
SATISFACTORY
SITUATIONS**

2003

Relaying Rails

NEW RAILS - ACCESSORIES

*Buy Guaranteed
Relaying Rails
and Save 30%
to 50%*

1 Ton or 1000

LBFOSTERCO

PITTSBURGH PA. NEW YORK CITY
JERSEY CITY PHILADELPHIA - HAMILTON O.

FOR SALE

30—GE-1000 Motors

50—GE-80 Motors

J. W. GERKE, 303 Fifth Avenue, N. Y. C.

FOR SALE

20—Hirney Safety Cars. Brill built. Seating 32.

8—Steel Interurbans, 48 ft. long. Seating 52.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

SOME ONE WANTS TO BUY

the equipment or machinery that you are not using.

This may be occupying valuable space, collecting dust, rust and hard knocks, in your shops and yards.

SELL IT BEFORE DEPRECIATION SCRAPS IT

THE SEARCHLIGHT SECTION
IS HELPING OTHERS

—LET IT HELP YOU ALSO

0125

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch
Stands
Ramapo Ajax Corp.

Automatic Safety Switch
Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
St. Louis Car Co.
Westinghouse E. & M. Co.

Axles (Front and Rear)
Motor Truck & Passenger Car
Timken-Detroit Axle Co.

Axles, Trailer & Motor Bus
Timken-Detroit Axle Co.

Babbitt Metal
Ajax Metal Co.

Babbitting Devices
Columbia Machine Wks.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co.,
The

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Brill Co., J. G., The
Columbia Machine Wks.
General Electric Co.
More-Jones Brass & Metal
Co.

Westinghouse E. & M. Co.

Bearings, Center and Roller
Slide
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia Machine Wks.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.

Bells
Brill Co., The J. G.
Columbia Machine Wks.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.

Boilers
Babcock & Wilcox Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Electric Railway Improve-
ment Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Bonds, Rail
Amer. Steel & Wire Co.
Electric Railway Improve-
ment Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.

Book Publishers
McGraw-Hill Book Co.

Boxes, Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms
(See also Poles, Ties,
Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Brill Co., The J. G.

Brakes, Brake Systems and
Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia Machine Wks.
General Electric Co.
National Brake Co.
Westinghouse Tr. Br. Co.

Brooms Wire & Rattan
Paxson Co., J. W.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.

Bus Seats
Heywood-Wakefield Co.

Buses, Motor
Brill Co., The J. G.
International Motor Co.
N. Y. Transportation Co.
St. Louis Car Co.

Bushings
National Metal Molding Co.

Bushings, Case Hardened
and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.

Cables. (See Wires and
Cables)

Cambrie Tapes, Yellow and
Black Varnish
Irvington Varnish & Ins.
Co.

Carbon Brushes (See
Brushes, Carbon)

Cars, Dump
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Cars, Passenger, Freight,
Express, etc.
Amer. Car Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Watson Mfg. Co.

Cars, Gas, Rail
Brill Co., J. G., The
St. Louis Car Co.

Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
Brill Co., J. G., The
General Electric Co.

Castings, Brass, Composition
or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. &
J. M.
Columbia Machine Wks.
More-Jones Brass & Metal
Co.

Castings, Gray Iron and
Steel
American Steel Foundries
Bemis Car Truck Co.
Columbia Machine Wks.

Castings, Malleable and
Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia Machine Wks.
Horne & Ebling Corp.

Catchers and Retrievers,
Trolley
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Ceilings, Plywood, Panels
Haskelite Mfg. Co.

Chairs, Parlor Car
Heywood-Wakefield Co.

Change Carriers
Cleveland Fare Box Co.

Circuit-Breakers
Anderson, A. & J. M. Mfg.
Co.
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for
Wires and Cables
Dossert & Co.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers Track
(See also Snow-Plows,
Sweepers and Brooms)
Brill Co., The J. G.

Cleats
Nat'l. Metal Molding Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See
Conveying and Hoisting
Machinery)

Coil Banding and Winding
Machines
Columbia Machine Wks.
Elec. Service Supplies Co.

Colls, Armature and Field
Columbia Machine Wks.
General Electric Co.
Westinghouse E. & M. Co.

Colls, Choke and Kieking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia Machine Wks.
General Electric Co.
Westinghouse E. & M. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Sullivan Machinery Co.
Westinghouse Tr. Br. Co.

Compressors, Gas
Sullivan Machinery Co.

Compressors, Portable
Sullivan Machinery Co.

Condensor Papers
Irvington Varnish & Ins.
Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Conduits, Interior
Nat'l. Metal Molding Co.

Connectors, Solderless
Dossert & Co.
Westinghouse E. & M. Co.

Connectors, Trailer Car
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia Machine Wks.
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Copper Wire
Anaconda Copper Mining
Co.

Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
Internatl Register Co.,
The

Reobling's Sons Co., John
A.
Samson Cordage Works
Silver Lake Co.

Cord Connectors and
Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing, Frog & Switch
Ramapo Ajax Corp.

Crossing, Manganese
Ramapo Ajax Corp.

Crossings
Ramapo Ajax Corp.

Crossing, Track (See Track,
Special Work)

Crossings, Trolley
Ohio Brass Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.

Dealer's Machinery
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

Derailing Devices (See also
Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Columbia Machine Wks.
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heat Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
St. Louis Car Co.

Doors & Door Fixtures
Brill Co., The J. G.
Consolidated Car Heat Co.
General Electric Co.
Morton Mfg. Co.
St. Louis Car Co.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

Drills, Rock
Sullivan Machinery Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.

Ears
Ohio Brass Co.

Economizers
Power Specialty Co.

Electrical Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebbing's Sons & Co.,
J. A.

Electric Gridladders
Western Electric Co.

Electrodes, Carbon
Rail Welding & Bonding Co.

Electrodes, Steel
Rail Welding & Bonding Co.

Enamels
Beckwith Chandler Co.

Engineers, Consulting, Con-
tracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layne Corp.
Bureau of Commercial
Economics, Inc.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Railway Audit & Inspec-
tion Co.
Richey, Albert S.
Robinson & Co., Dwight
P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The
J. G.

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.

Fare Registers
Ohmer Fare Register Co.

Fences, Woven Wire and
Fence Posts
Acme Wire Co.
Amer. Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Flangeway Guards, Steel
W. S. Godwin Co., Inc.

Floodlights
Elec. Service Supplies Co.

Forgings
Brill Co., J. G., The

Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.

Frogs, Track (See Track
Work)

Frogs, Trolley
Ohio Brass Co.

Fuses and Fuse Boxes
Columbia Machine Wks.
Consolidated Car Heat. Co.
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Refillable
General Electric Co.
Johns-Manville, Inc.

Gaskets
Westinghouse Tr. Br. Co.

Gas Producers
Westinghouse E. & M. Co.

Gas-Electric Cars
General Elec. Co.
Westinghouse E. & M. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Brill Co., J. G., The

Gear Cases
Chillingworth Mfg. Co.
Columbia Machine Wks.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia Machine Wks.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion
Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Gilder Rails
Lorain Steel Co.

Gong (See Bells and Gongs)

Greases (See Lubricants)

Grinders & Grinding Supplies
Metal & Thernit Corp.

Guard Rail Clamps
Ramapo Ajax Corp.

Guard Rails, Tee Rail &
Manganese
Ramapo Ajax Corp.

Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Elec. Service Supplies Co.
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Headlining
Haskelite Mfg. Co.
Panelyte Co.

Heaters for Special Purposes
Power Specialty Co.

Heaters, Car (Electric)
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and
Water
Elec. Service Supplies Co.
Smith Heater Co., Peter

Helmetts, Welding
Rail Welding & Bonding Co.

Hoists & Lifts
Columbia Machine Wks.

Hoists, Portable
Sullivan Machinery Co.

Hydraulic Machinery
Allis-Chalmers Mfg. Co.

Instruments Measuring, Test-
ing and Recording
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and
Tape
General Electric Co.
Irvington Varnish & Ins.
Co.

Okonite Co.
Stand. Underground Cable
Co.
Westinghouse E. & M. Co.

Insulating, Silk & Varnish
Irvington Varnish & Ins.
Co.

Insulation (See also Paints)
Electric Ry. Equipment
Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins.
Co.

Insulators (See also Line
Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins.
Co.

Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.



Cold Dinners

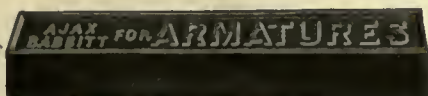
for *your* passengers?

Not if you use

AJAX

BABBITT for ARMATURES

keeps the rolling stock rolling



The Ajax Metal Company

Established 1880

PHILADELPHIA

NEW YORK

CHICAGO

BOSTON

CLEVELAND



"Differential Two-Car Train. Trailer dumping load clear of trench."

DIFFERENTIAL CARS

Standard on Fifty Railways for

Track Maintenance

Ash Disposal

Placing Ballast

Coal Hauling

Track Construction

Hauling Crossties

Disposal of Waste

Snow Disposal

Concrete Materials to the Job

Excavated Material to the Dump

For Economy

THE CLARK CONCRETE BREAKER

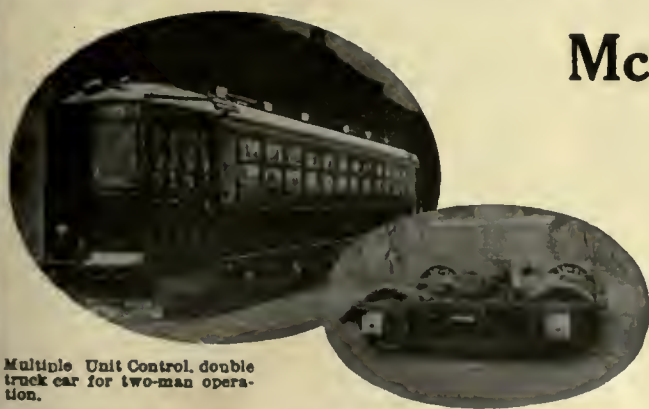
THE DIFFERENTIAL BOTTOM DUMP CAR

THE DIFFERENTIAL COMBINATION

CAR-WHEEL TRUCK and TRACTOR

THE DIFFERENTIAL STEEL CAR CO.

Findlay, Ohio, U. S. A.



Multiple Unit Control double truck car for two-man operation.

McGUIRE-CUMMINGS

Manufacturing Company

General Offices

111 W. Monroe St., Chicago, Ill.

Street Cars, Trucks Snow Sweepers

Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

**FOR POSITIVE SATISFACTION ORDER
SILVER LAKE**

If you are not familiar with the quality you will be surprised at its **ENDURANCE** and **ECONOMY**.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY

Manufacturers of bull, signal and other cords.

Newtonville, Massachusetts



THORNTON

The trolley wheel with the high mileage side bearing

Thornton Wheels with Thornton side bearings are unusually long-lived, require less lubrication, and less maintenance. They are free from vibration and noiseless. No bushings. *Investigate them.*

Bearings make fifty thousand or more miles

Send for descriptive circular

Thornton Trolley Wheel Co.,

Incorporated

Ashland, Kentucky

- Insulator Pins**
Elec. Service Supplies Co.
Hubbard & Co.
- Jacks** (See also Cranes, Hoists and Lifts)
Buda Company
Columbia Machine Wks.
Elec. Service Supplies Co.
- Joints, Rail**
(See Rail Joints)
- Journal Boxes**
Bemis Car Truck Co.
Brill Co., J. G.
- Junction Boxes**
Horne & Ebling Corp.
Std. Underground Cable Co.
- Lamps, Guards and Fixtures**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Arc and Incandescent**
(See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Signal and Marker**
Nichols-Lintern Co.
Ohio Brass Co.
- Lanterns, Classification**
Nichols-Lintern Co.
- Lightning Protection**
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.
- Line Material** (See also Brackets, Insulators, Wires, etc.)
Archbold-Brady Co.
Dossert & Co.
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Locomotives, Electric**
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
- Lubricating Engineers**
Galena Signal Oil Co.
Standard Oil Co.
Texas Co.
- Lubricants, Oil and Grease**
Galena Signal Oil Co.
Standard Oil Co.
Texas Co.
Universal Lubricating Co.
- Manganese Parts**
Bemis Car Truck Co.
- Manganese Steel Guard Rails**
Ramapo Ajax Corp.
- Manganese Steel Switches, Fuses & Crossings**
Ramapo Ajax Corp.
- Meters** (See Instruments)
- Molding, Metal**
Allis-Chalmers Mfg. Co.
Nat'l. Metal Molding Co.
- Motor Buses** (See Buses, Motor)
- Motor Leads**
Dossert & Co.
- Motors, Electric**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.
- Motors and Generators, Sets**
Allis-Chalmers Mfg. Co.
General Electric Co.
- Motormen's Seats**
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.
- Nuts and Bolts**
Bemis Car Truck Co.
Hubbard & Co.
- Oil Heaters**
Power Specialty Co.
- Oils** (See Lubricants)
- Omnibuses** (See Buses, Motor)
- Oxy-Acetylene** (See Cutting Apparatus, Oxy-Acetylene)
- Packing**
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
- Paints and Varnishes** (Insulating)
Beckwith-Chandler Co.
Irvington Varnish & Ins. Co.
- Paints and Varnishes for Woodwork**
Beckwith-Chandler Co.
National Ry. Appliance Co.
- Pavement Breakers**
Ingersoll-Rand Co.
Sullivan Machinery Co.
- Paving Guards, Steel**
W. S. Godwin Co., Inc.
- Paving Material**
Amer. Br. Shoe & Fdy. Co.
- Pickup, Trolley Wire**
Elec. Service Supplies Co.
Ohio Brass Co.
- Pinion Pellers**
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.
- Pinions** (See Gears)
- Pins, Case Hardened, Wood and Iron**
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.
- Pins Wood & Iron**
Sharp, E. P.
- Pipe Fittings**
Westinghouse Tr. Brake Co.
- Planers** (See Machine Tools)
- Plates for Tee Rail Switches**
Ramapo Ajax Corp.
- Pliers, Rubber Insulated**
Elec. Service Sup. Co.
- Plugs**
Nat'l. Metal Molding Co.
- Pole Line Hardware**
Ohio Brass Co.
- Poles, Metal Street**
Elec. Ry. Equipment Co.
Hubbard & Co.
Truscon Steel Co.
- Pole Reinforcing**
Hubbard & Co.
- Poles & Ties Treated**
Bell Lumber Co.
International Creosoting & Construction Co.
- Poles, Ties, Posts, Piling & Lumber**
Bell Lumber Co.
International Creosoting & Construction Co.
- Poles, Trolley**
Bell Lumber Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.
- Poles, Tubular Steel**
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
- Portable Grinders**
Buda Company
- Pathways**
Okonite Co.
- Power Saving Devices**
National Ry. Appliance Co.
- Pressure Regulators**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Pumps**
Allis-Chalmers Mfg. Co.
- Pumps, Air Lift**
Sullivan Machinery Co.
- Pumps Vacuum**
Ingersoll-Rand Co.
Sullivan Machinery Co.
- Punches, Ticket**
Intern'l Register Co., The
Wood Co., Chas. N.
- Rail Braces & Fastenings**
Ramapo Ajax Corp.
- Rail Filler**
Philip Carey Co.
- Rail Grinders** (See Grinders)
- Rail Joints**
Carnegie Steel Co.
Rail Joint Co.
- Rail Joints—Welded**
Lorain Steel Co.
Metal & Thermit Corp.
- Rails, Relaying**
Foster Co., L. B.
Hyman-Michaels Co.
- Rails, Steel**
Carnegie Steel Co.
Foster Co., L. B.
- Rail Welding**
Metal & Thermit Corp.
Rail Welding & Bonding Co.
- Railway Paving Guards, Steel**
Godwin Co., Inc., W. S.
- Railway Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.
- Rattan**
Brill Co., The J. G.
Elec. Service Supplies Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
- Rattan Car Seat Webbing**
Heywood Wakefield Co.
- Reclaimers, Waste & Oil**
Oil & Waste Saving Machine Co.
- Registers and Fittings**
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Ohmer Fare Register Co.
Rooke Automatic Register Co.
- Reinforcement, Concrete**
Amer. Steel & Wire Co.
- Repair Shop Appliances** (See also Coil Banding and Winding Machines)
Elec. Service Supplies Co.
- Repair Work** (See also Colla)
General Electric Co.
Westinghouse E. & M. Co.
- Replacers, Car**
Elec. Service Sup. Co.
- Resistances**
Consolidated Car Heat. Co.
- Resistance, Wire and Tube**
General Electric Co.
Westinghouse E. & M. Co.
- Retrievers, Trolley** (See Catchers and Retrievers, Trolley)
- Rheostats**
General Electric Co.
Westinghouse E. & M. Co.
- Roller Bearings**
Hyatt Roller Bearing Co.
- Roofs**
Haskelite Mfg. Co.
- Rosettes**
Nat'l Metal Molding
- Sanders, Track**
Brill Co., The J. G.
Elec. Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
- Sash Fixtures, Car**
Brill Co., The J. G.
Horne & Ebling Corp.
- Scrapers, Track** (See Cleaners and Scrapers, Track)
- Screw Drivers, Rubber Insulated**
Elec. Service Sup. Co.
- Seats, Bus**
Brill Co., The J. G.
Heywood-Wakefield Co.
St. Louis Car Co.
- Seats, Car** (See also Rattan)
Brill Co., The J. G.
Heywood-Wakefield Co.
St. Louis Car Co.
- Seating Materials**
Brill Co., J. G.
Heywood-Wakefield Co.
- Second Hand Equipment**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.
- Shades, Vestibule**
Brill Co., The J. G.
- Shovels**
Brill Co., The J. G.
Hubbard & Co.
- Side Bearings** (See Bearings, Center and Side)
- Signals, Car Starting**
Consolidated Car Heat. Co.
Elec. Service Sup. Co.
Nat'l. Pneumatic Co., Inc.
- Signals, Indicating**
Nichols-Lintern Co.
- Signal Systems, Highway Crossing**
Nachod Signal Co., Inc.
Wood Co., Chas. N.
- Signal Systems, Block**
Elec. Service Sup. Co.
Nachod Signal Co., Inc.
- Slack Adjusters** (See Brake Adjusters)
- Sleet Wheels and Cutters**
Anderson Mfg. Co., A. & J. M.
Columbia Machine Wks.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
- Smokestacks, Car**
Nichols-Lintern Co.
- Snow-Plows, Sweepers and Brooms**
Brill Co., The J. G.
Columbia Machine Wks.
Consolidated Car Fender Co.
Heywood-Wakefield Co.
McGuire-Cummings Mfg. Co.
- Sockets & Receptacles**
National Metal Molding Co.
- Soldering and Brazing Apparatus** (See Welding Processes and Apparatus)
Irvington Varnish & Ins. Co.
- Special Adhesive Papers**
Irvington Varnish & Ins. Co.
- Special Trackwork**
Lorain Steel Co.
- Spikes**
Amer. Steel & Wire Co.
- Splining Compounds**
Westinghouse E. & M. Co.
- Splining Sleeves** (See Clamps and Connectors)
- Springs, Car and Truck**
American Steel Foundries
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
St. Louis Car Co.
- Sprinklers, Track and Road**
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
- Steel and Steel Products**
Carnegie Steel Co.
- Steps, Car**
Brill Co., The J. G.
Morton Mfg. Co.
- Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse E. & M. Co.
- Stop Signals**
Nichols-Lintern Co.
- Storage Batteries** (See Batteries, Storage)
- Strain, Insulators**
Anderson, A. & J. M. Mfg. Co.
Ohio Brass Co.
- Strand**
Roebling's Sons Co., J. A.
- Superheaters**
Babcock & Wilcox Co.
Power Specialty Co.
- Sweepers, Snow** (See Snow Plows, Sweepers and Brooms)
- Switches, Safety**
Johns-Pratt Co.
- Switches, Selector**
Nichols-Lintern Co.
- Switches, Tee Rail**
Ramapo Ajax Corp.
- Switches, Track** (See Track Special Work)
- Switches and Switchboards**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Tapes and Cloths** (See Insulating Cloth, Paper and Tape)
- Tee Rail Special Track Work**
Ramapo Ajax Corp.
- Telephones and Pans**
Elec. Service Supplies Co.
- Terminals, Cable**
Std. Underground Cable Co.
- Testing Instruments** (See Instruments, Electrical Measuring, Testing, etc.)
- Thermistats**
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter
- Ticket Choppers & Destroyers**
Elec. Service Supplies Co.
- Ties, Mechanical**
Dayton Mechanical Tie Co.
- Ties and Tie Rods, Steel**
Carnegie Steel Co.
Godwin Co., Inc., W. S.
International Steel Tie Co.
- Ties, Wood Cross** (See Poles, Ties, Posts, etc.)
- Tools, Track & Miscellaneous**
Amer. Steel & Wire Co.
Columbia Machine Works
Elec. Service Supplies Co.
Hubbard & Co.
- Torches, Acetylene** (See Cutting Apparatus)
- Towers and Transmission Structures**
Archbold-Brady Co.
Westinghouse E. & M. Co.
- Trackless Trolley Cars**
Brill Co., The J. G.
St. Louis Car Co.
- Track Grinders**
Metal & Thermit Corp.
- Track, Special Work**
Buda Company
Columbia Machine Wks.
N. Y. Switch & Crossing Co.
Ramapo Ajax Corp.
- Transfer** (See Tickets)
- Transfer Issuing Machines**
Ohmer Fare Register Co.
- Transfer Tables**
American Bridge Co.
- Transformers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Treads, Safety, Stair, Car Step**
Morton Mfg. Co.
- Trolley Bases**
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
- Trolley Bases, Retrieving**
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.
- Trolley Buses**
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.
- Trolley Material, Overhead**
Anderson, A. & J. M.
Mfg. Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
- Trolley Shoe**
Miller Trolley Shoe Co.
- Trolley Wheel Bushings**
More-Jones Brass & Metal Co.
- Trolley Wheels & Harps**
More-Jones Brass & Metal Co.
Thornton Trolley Wheel Co.
- Trolley Wheels** (See Wheels, Trolley)
- Trolley Wire**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
Roebling's Sons Co., J. A.
- Trucks, Car**
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Taylor Elec. Truck Co.
- Tubing, Yellow & Black**
Flexible Varnish
Irvington Varnish & Ins. Co.
- Turbines, Steam**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Turbines, Water**
Allis-Chalmers Mfg. Co.
- Turnstiles**
Elec. Service Supplies Co.
Percy Mfg. Co., Inc.
- Valves**
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Varnished Papers & Silks**
Irvington Varnish & Ins. Co.
- Ventilators, Car**
Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.
- Welded Rail Joints**
Alumino-Thermit Corp.
Electric Railway Improvement Co.
- Welding**
Metal & Thermit Corp.
Ohio Brass Co.
Rail Welding & Bonding Co.
- Welding Processes and Apparatus**
Alumino-Thermit Corp.
Electric Railway Improvement Co.
General Electric Co.
Metal & Thermit Corp.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.
- Welding Steel**
Electric Railway Improvement Co.
Rail Welding & Bonding Co.
- Wheel Guards** (See Fenders and Wheel Guards)
- Wheel Presses** (See Machine Tools)
- Wheels, Car, Cast Iron**
Bemis Car Truck Co.
Carnegie Steel Co.
Griffin Wheel Co.
- Wheels, Car, Steel & Steel Tire**
American Steel Foundries
- Wheels, Wrought Steel**
Carnegie Steel Co.
- Wheels, Trolley**
Columbia Machine Wks.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Sharp, E. P.
Star Brass Works
- Whistles, Air**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Wire Rope**
Roebling's Sons Co., J. A.
- Wires and Cables**
Acme Wire Co.
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
General Electric Co.
Okonite Co.
Roebling's Sons Co., J. A.
Westinghouse E. & M. Co.
Std. Underground Cable Co.



Fifty-one cities will use the Carey Elastite System of Track Insulation in their track work this spring.

"Sho am a easy job, boss!"

Installation of Carey Elastite track insulation is easy, and does not interfere with other work in track construction. Two or three laborers can set the rail filler in the time between welding and spiking of track and the concrete pouring.

The Carey Elastite System of Track Insulation protects both track and pavement from destructive rail vibration, traffic-impact, and frost-action. It pays a profit over and above by greatly reducing maintenance cost on tracks and rolling stock, at the same time insuring much quieter operation.

THE PHILIP CAREY COMPANY
53 Wayne Ave., Lockland, Cincinnati, O.

Elastite Rail Filler Is Easy to Install

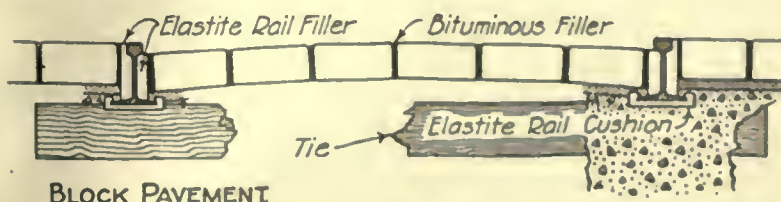
*a tap of a mallet holds it
in the web of the rail*

Carey Elastite Rail Filler is a composition of specially-tempered asphalt and fibre which is used as a resilient cushion between the rail and the pavement absorbing traffic-impact, rail vibration and traffic-noise. It is pre-formed to fit any rail-section and is readily shaped on the job to fit any track-curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

Carey Elastite

Send for Complete Data

SYSTEM OF TRACK INSULATION



ALPHABETICAL INDEX TO ADVERTISEMENTS

Page	Page	Page	Page
A		K	
Acma Wire Co..... 46	Electric Ry. Improvement Co.. 48	Kelly-Cooke Co. 18	R
Ajax Metal Co..... 53	Electric Service Supplies Co... 7	Kuhlman Car Co..... 57	Rail Joint Co..... 40
Allis-Chalmers Mfg. Co..... 47			Rail Welding & Bonding Co... 26
Allison Co., J. E..... 19	F		Railway Audit & Inspection Co. 19
Alumino-Thermic Corp..... 48	Ford, Bacon & Davis 18		Railway Utility Co..... 50
Amer. Brake Shoe & Fdy. Co.. 49	"For Sale" Ads..... 51	L	Ramapo Ajax Corp..... 50
American Car Co..... 57	Fort Pitt Spring & Mfg. Co... 47	Le Carbone Co..... 49	Richey, Albert S..... 18
American Electrical Works.... 45	Foster Co., Inc., L. B..... 50	Lorain Steel Co..... 46	Robinson Co., Dwight P..... 18
American Steel Foundries.... 33			Roebbling's Sons Co., John A... 45
American Steel & Wire Co.... 45	G		Rooke Automatic Register Co.. 50
Anaconda Copper Mining Co... 45	Galena Signal Oil Co..... 15	M	
Anderson Mfg. Co., A. & J. M.. 45	General Electric Co., 16, Back Cover	McGraw-Hill Book Co..... 10	S
Archbold-Brady Co..... 19	Godwin Co., W. S., Inc..... 48	McGuire-Cummings Mfg. Co... 53	St. Louis Car Co..... 27
	Gold Car Heating & Ltg. Co... 50	Metal & Thermit Corp..... 25	Sameon Cordage Works..... 50
B	Griffin Wheel Co..... 49	Miller Trolley Shoe Co..... 21	Sanderson & Porter 18
Babcock & Wilcox Co..... 47	H	More-Jones Brass & Metal Co.. 37	Searchlight Section 51
Beckwith-Chandler Co. 28	Hale-Kilburn Co..... 44	Morton Mfg. Co..... 50	Sharp, Edw. P..... 50
Beeler Organization 18	Haskelite Mfg. Co..... 44		Sliver Lake Co..... 53
Bemis Car Truck Co..... 24	"Help Wanted" Ads..... 51	N	Smith Heater Co., Peter..... 50
Bethlehem Steel Co..... 30	Hemphill & Wells 18	Nachod Signal Co., Inc..... 45	Standard Oil Co..... 34
Bibbline, J. Rowland 18	Heywood-Wakefield Co..... 43	National Brake Co..... 17	Standard Underground Cable Co. 45
Bridgeport Brass Co..... 10	Holst, Englehardt W..... 18	National Metal Molding Co... 35	Star Brass Works..... 49
Brill Co., The J. G..... 57	Horne & Ebling Corp..... 50	National Pneumatic Co., Inc.. 9	Stevens & Wood, Inc..... 18
Buchanan & Layng Corp..... 19	Hubbard & Co..... 45	National Ry. Appliance Co.... 47	Stone & Webster 18
Buda Co. 46	Hyatt Roller Bearing Co..... 41	N. Y. Switch & Crossing Co... 40	Stucki Co., A..... 56
Bureau of Comm. Economics.	Hyman-Michaels Co..... 51	New York Transportation Co.. 11	Sullivan Machinery Co..... 43
Inc. 19		Nichols-Lintern Co..... 48	
C	I	Nuttall Co., R. D..... 32	T
Cameron Electrical Mfg. Co... 47	International Creosoting & Con-		Texas Co..... 31
Carey Co., Philip 55	struction Co. 6	O	Thornton Trolley Wheel Co... 53
Carnegie Steel Co..... 47	International Motor Co..... 12-13	Ohio Brase Co..... 5	Timken-Detroit Axle Co..... 38
Chillingworth Mfg. Co..... 56	International Register Co., The. 48	Ohmer Fare Register Co..... 48	Tool Steel Gear & Pinion Co.. 39
Cleveland Fare Box Co..... 48	International Steel Tie Co., The.	Oil & Waste Saving Machine Co. 47	Transit Equipment Co..... 51
Collier, Inc., Barron G..... 40	Front Cover	Okonite Co., The..... 8, 45	
Columbia Machine Works.... 36		Ong, Joe R..... 18	U
Consolidated Car Feeder Co... 50	J		Universal Lubricating Co..... 49
Consolidated Car Heating Co.. 29	Jackson, Walter 18	P	
	Jeandron, W. J..... 40	Panelyte Co. 50	W
D	Johnson & Co., Inc., J. R..... 56	Paxon Co., J. W..... 48	"Want" Ads. 51
Day & Zimmermann, Inc..... 18	Johnson Fare Box Co..... 50	Perey Mfg. Co., Inc..... 50	Wason Mfg. Co..... 57
Dayton Mech. Tie Co..... 22 23		Positions Wanted and Vacant.. 51	Westinghouse Elec. & Mfg. Co. 2
Differential Steel Car Co., The. 53		Power Specialty Co..... 47	Wiah Service, The P. Edw... 19
Dossert & Co..... 40			Westinghouse Traction Brake Co. 4
E			White Eng. Corp., The J. G... 18
Electric Equipment Co..... 51			Wood Co., Chas. N..... 45
Electric Ry. Equipment Co... 20			



CHILLINGWORTH

One-Piece Gear Cases
Semis—Rivets—Light Weight
Best for Service—Durability and
Economy. Write Us.

Chillingworth Mfg. Co.
Jersey City, N. J.

*Only reliable products can
be continuously
advertised*

"Axle Specialists Since 1866"
Address all Mail to Post Office Box 515, Richmond, Va.

CAR AXLES
J. R. JOHNSON AND CO., INC.

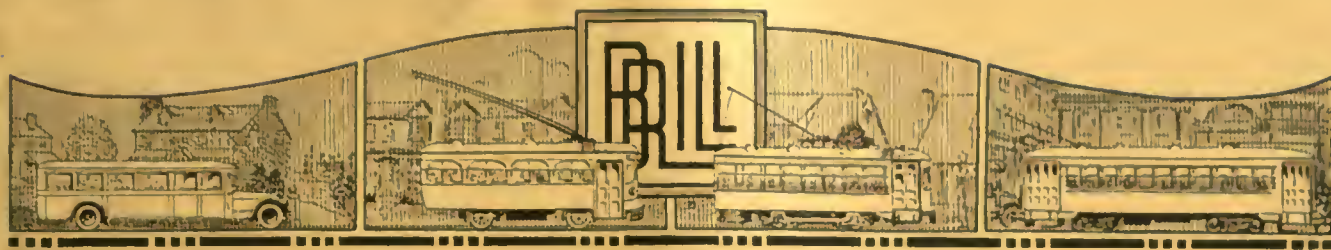
FORGED STEEL AXLES

For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or
Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large
Shafts, Round Bars, etc.



**STUCKI
SIDE
BEARINGS**

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.



Light-Weight Interurban Type Car— Brill 77-E Trucks with Twin Links

This single-end combination passenger and baggage type car, recently built by The G. C. Kuhlman Car Company for The Ohio Public Service Company's lines between Mansfield and Shelby, Ohio, has many distinctive features.

In addition to its light weight of 31,460 lb. complete with quadruple 25-Hp. motors, its Brill 77-E trucks are equipped with Twin Swing Links, which retain the superior

riding action under the higher rates of speed and on uneven track. Also, with the main passenger compartment in front and the absence of any forward bulkhead, an excellent view is obtained from this compartment.

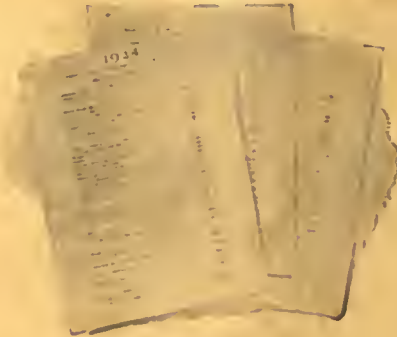
This type car measures 38 ft. 1¼ in. over platforms, 8 ft. 6 in. wide over posts, 32-in. post centers, and seats 44 passengers, 16 of which are in the combined smoking and baggage compartment at rear.

 **THE J. G. BRILL COMPANY** 
 PHILADELPHIA, PA.
 AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MAN'G CO.
 ST. LOUIS, MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.





A year of repeat orders



82%
of CP Compressors
go to CP users

And the other 18% of 1924 purchases were for companies who more recently decided to take advantage of CP supremacy.

For reliability and low cost of operation the CP Compressor has no superior. Many railways are maintaining their CP Compressors at a cost of only \$3 per compressor per year

GENERAL ELECTRIC
GENERAL ELECTRIC COMPANY, SCHENECTADY, NEW YORK



